UNIVERSITY OF
ILLINOIS LIBRARY
AT URBANA-CHAMPAIGN
BOOKSTACKS

The person charging this material is responsible for its return to the library from which it was withdrawn on or before the **Latest Date** stamped below.

Theft, mutilation, and underlining of books are reasons for disciplinary action and may result in dismissal from the University.

UNIVERSITY OF ILLINOIS LIBRARY AT URBANA-CHAMPAIGN

MAR 2 0 1976
FEB 2 2 1976

L161—O-1096

UNIVERSITY OF ILLINOIS-URBANA

.33391
48

SELECTED WATER RESOURCES ABSTRACTS

The Library of the

SEP 3 1974

University of Illinois
at Urbana-Champaign

VOLUME 7, NUMBER 5
MARCH 1, 1974

W74-02151 -- W74-02650

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

SELECTED WATER RESOURCES ABSTRACTS is available to Federal agencies, contractors, or grantees in water resources upon request to: Manager, Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior, Washington, D. C. 20240.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from the National Technical Information Service. Annual subscription is $45 (domestic), $56.25 (foreign). Certain documents abstracted in this journal can be purchased from the NTIS at prices indicated in the entry. Prepayment is required.

151

SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 7, NUMBER 5
MARCH 1, 1974

W74-02151 -- W74-02650

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

Doc.
I 19.4/2
7/5-8

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1A. Properties

OPTICAL CONSTANTS OF WATER IN THE 200-NM TO 200-MICROMETER WAVELENGTH REGION,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 02K.
W74-02167

02. WATER CYCLE

2A. General

CALIBRATING A WATER YIELD MODEL FOR SMALL UNGAGED WATERSHEDS,
Kentucky Dept. of Natural Resources, Frankfort. Div. of Water.
J. E. Jarboe, and C. T. Haan.
Paper No. 73-207 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 27 p, 1 fig, 10 tab, 7 ref.

Descriptors: *Small watersheds, Model studies, *Water yield, *Calibrations, Instrumentation, Measurement, *Kentucky, Runoff, *Watershed management.

A four-parameter water yield model was calibrated to small Kentucky watersheds by relating the model parameters to watershed topographic, geologic and soil characteristics. The relationships were tested by comparing observed and simulated runoff records. (SCS)
W74-02172

HYDROLOGIC AND WATERSHED MODELING FOR WATERSHED PLANNING,
Soil Conservation Service, Portland, Oreg.
For primary bibliographic entry see Field 04D.
W74-02224

THE WATER BALANCE OF NEW ZEALAND,
Ministry of Works, Wellington (New Zealand). Water and Soil Div.
C. Toebes.
Journal of Hydrology (New Zealand), Vol 11, No 2, p 127-139, 1972. 1 tab, 23 ref.

Descriptors: *Water balance, Water yield, Water storage, Groundwater, Surface waters, Lakes, *Runoff, Rainfall, *Precipitation (Atmospheric), Data collections, Hydrologic data, *Evapotranspiration.
Identifiers: *New Zealand.

Using spearate estimates of average annual precipitation, evapotranspiration and runoff, a water balance for approximately 10 years was calculated for New Zealand. It is postulated that equilibrium conditions are never reached within the New Zealand hydrological system. The storage factor is relatively small. Only depletion of the groundwater above the base level in New Zealand is likely to have an effect on the water balance. (Knapp-USGS)
W74-02291

WATER-BALANCE METHOD AND ITS PRACTICAL IMPORTANCE, (METOD VODNOGO BALANSA I YEGO PRAKTICHESKOYE ZNACHENIYE),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
P. S. Kuzin.
Meteorologiya i Gidrologiya, No 4, p 99-106, April 1973. 26 ref.

Descriptors: *Water balance, *Hydrologic cycle, Inflow, Discharge (Water), Precipitation (Atmospheric), Evaporation, Runoff, Water storage, *River basins, *Lake basins, Equations.
Identifiers: USSR, Global hydrology.

Evolution of concepts of the water-balance equation and practical importance of the water-balance problem are discussed. Four main objectives in the study of water balance are: (1) determination of the relation of balance items on natural factors (topography, geology, climate, soils, vegetation, etc.); (2) assessment of changes in balance items resulting from man's activities; (3) implementation of measures aimed at more rational use of water resources for power engineering, irrigation, navigation, water supply, etc.; and (4) control of accuracy of actual measurements of hydrometeorological elements and, in some cases, calculation of nonreadily measurable values. Depending on the objectives, the water-balance method can be used to quantitatively determine individual balance items for river basins and other areas and to establish geographic patterns in the distribution of relations between items. Studies of world water balance should begin on a national and regional scale with major river and lake basins to derive more correct estimates of water balance of continents, oceans, and the world. Special attention must be given to distribution of hydrometeorological networks, quality of observations, and accuracy of initial data used in water-balance computations. (Josefson-USGS)
W74-02308

ADJUSTMENT OF FRICTION IN HYDRAULIC MODELS OF LAKES,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
For primary bibliographic entry see Field 02H.
W74-02314

ELEVATION DEPENDENT MODEL FOR ESTIMATING ANNUAL RUNOFF,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith, D. A. Anderson, and R. G. Scott.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10245, p 2293-2311, December 1973. 5 fig, 8 tab, 6 ref, 3 append.

Descriptors: *Topography, *Streamflow forecasting, *Rainfall-runoff relationships, *Mathematical models, Regression analysis.

Two procedures are given for decomposing runoff into components corresponding to different elevations. In the first method, the individual proportions of area in each band are regressed against the respective basin runoffs for each year to determine coefficients that represent the runoff contribution from each elevation band. Applying the principles of ridge regression analysis to this model yields stable estimates. The second procedure is an extension of the first and develops a functional relationship between the elevation variable and runoff. The two procedures were tested on 23 yrs of annual runoff from eight drainages in the upper Green River basin of the Wind River Range. The procedures give hydrologically interpretable results and are useful in modeling a drainage. The procedures are applicable for estimation of annual runoff for ungaged drainages and at stations where gaging has been discontinued. (Knapp-USGS)
W74-02317

A BAYESIAN DECISION FRAMEWORK FOR SYNTHETIC HYDROLOGY,
IBM Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 06A.
W74-02438

HYMO: PROBLEM-ORIENTED COMPUTER LANGUAGE FOR HYDROLOGIC MODELING--USERS MANUAL,
Agricultural Research Service, Riesel, Tex.
J. R. Williams, and R. W. Hann, Jr.
Southern Region Report ARS-S-9, May 1973. 75 p, 4 fig, 1 tab, 8 ref.

Descriptors: *Programming languages, *Computer programs, *Mathematical models, Simulation analysis, Rainfall-runoff relationships, Model studies.

HYMO is a problem-oriented computer language for modeling surface runoff and sediment yield from watersheds. HYMO was designed for planning flood prevention projects, forecasting floods, and research studies. It consists of a main program and 16 subroutines written in FORTRAN IV, but it can be used by hydrologists with little knowledge of computer programming. The language provides 17 commands for the hydrologist to use in any sequence for application to any watershed. HYMO was designed to transform rainfall data into runoff hydrographs and to route these hydrographs through streams and valleys or reservoirs. It will also compute the amount of sediment produced by a storm at nay point on a watershed. It will be useful to research hydrologists in studying the effects of watershed and storm characteristics on the flood hydrograph. HYMO is also a good research tool for testing hydrologic procedures. The hydrologic procedures used in HYMO are practical--required inputs are easy to obtain for most watersheds. HYMO was written for the IBM 360-65 computer, but it could be run on an IBM 1130 with little modification. The storage requirement is about 73K. (Knapp-USGS)
W74-02469

HYDROGEOLOGY OF CLOSED BASINS AND DESERTS OF SOUTH AMERICA, ERTS-1 INTERPRETATIONS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07B.
W74-02588

PRELIMINARY ANALYSIS OF ERTS--RELAYED WATER-RESOURCES DATA IN THE DELAWARE RIVER BASIN,
Geological Survey, Harrisburg, Pa.
For primary bibliographic entry see Field 07B.
W74-02595

WATER-RESOURCES APPRAISAL OF FISH LAKE VALLEY, NEVADA AND CALIFORNIA,
Geological Survey, Carson City, Nev.
F. E. Rush, and T. L. Katzer.
Nevada Division of Water Resources, Water Resources-Reconnaissance Series Report 58, 1973. 70 p, 9 fig, 21 tab, 21 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Nevada, *California, Valleys, Hydrologic data, Water quality, Chemical analysis, Precipitation (Atmospheric), Runoff, Streamflow, Flow rates, Hydrogeology, Water wells, Water yield, Water supply, Water utilization, Water demand, Irrigation, Mining, Well data, Groundwater recharge, Hydrology.
Identifiers: *Fish Lake Valley (Nev. and Calif.).

Fish Lake Valley is in Esmeralda County, Nevada, and the adjoining part of Mono County, California. Fish Lake Valley has a population of about 200 in an area of about 1,010 square miles. The local economy is principally ranching and farming; however, some mining is done on an intermittent basis. The nearest trade center is Bishop, California, about 50 road miles southwest of the valley. The report describes the hydrologic environment; appraises the source, occurrence, movement, and chemical quality of water in the

area; estimates average annual recharge to and discharge from the groundwater reservoir; provides preliminary estimates of perennial yield and groundwater in storage; and estimates present and potential water development in the area. The field work was done mostly during August 1970 and March 1971. Groundwater development in Nevada has shown a substantial increase in recent years. A part of this increase is due to the effort to bring new land into cultivation, a renewed interest in mining, and a growing population. (Woodard-USGS)
W74-02616

SUMMARY OF HYDROLOGIC CONDITIONS IN COLLIER COUNTY, FLORIDA, 1972,
Geological Survey, Tallahassee, Fla.
J. McCoy.
Open-file report 73022, 1973. 118 p, 11 fig, 8 ref, append.

Descriptors: *Hydrologic data, *Water resources development, *Surface waters, *Groundwater resources, *Florida, Streamflow, Flow rates, Gaging stations, Water wells, Aquifer characteristics, Water yield, Water level fluctuations, Water utilization, Canals, Water quality, Chemical analysis, Basic data collections, Rainfall, Hydrology, Groundwater recharge, Urbanization.
Identifiers: *Collier County (Fla), *Naples (Fla).

This report is a continuation of annual summaries of hydrologic conditions in Collier County, Florida, which began in 1968. Streamflow and water-level fluctuations are graphed for the 1972 year (October 1971 to September 1972). Water-quality data are presented in table, graph, and diagram forms for their periods of record. Changes in hydrologic conditions are monitored by a data-collection network throughout the county and in the urbanized Naples area. The county-wide network consists of 5 streamflow gaging stations, 16 wells equipped with continuous water-level recorders, 19 wells sampled semiannually for chloride analyses, and 13 surface-water sites sampled semiannually for nutrient analyses. The Naples network consists of 1 streamflow gaging station, 3 wells equipped with continuous water-level recorders, about 75 wells sampled and/or measured semiannually for semiannually for chloride analyses and/or water-level fluctuations, and 4 surface water sites sampled quarterly for extensive analyses of chemical, physical, and bacteriological parameters. (Woodard-USGS)
W74-02622

PROPOSED WATER-RESOURCES AND LAND--CAPABILITY INVESTIGATION, ARUSHA REGION, TANZANIA,
Geological Survey, Lakewood, Colo.
E. D. Gordon, and J. F. O'Rourke.
Open-file report, March 1973. 118 p, 15 fig, 34 ref, 2 append.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Land development, *Foreign countries, Tropical regions, Hydrologic data, Topography, Geology, Soil types, Climatic data, Water quality, Vegetation, Land use, Water supply, Human population, Water utilization, Rainfall, Temperature, Hydrology, Planning, Water resources development.
Identifiers: *United Republic of Tanzania.

The findings of a 3-month Phase I reconnaissance evaluation of the water-resources and land-use problems of the Arusha Region in north-central Tanzania are described. The scope, objectives and requirements are outlined for a proposed longer-term more intensive Phase II survey needed to develop a Master Water Plan for the Region. The Arusha Region lies 2 deg to 6 deg south of the Equator, and consequently, temperatures are relatively uniform throughout the year. Annual rainfall, which ranges from about 15 to slightly more than 60 inches, varies with elevation. In the cooler, higher and water-surplus areas cash-crop farming provides the economic base, but in the warmer, lower and water-deficient areas the economy is predominantly pastoral. The chief water and land-use problems in the Region are: (1) insufficient water supplies in some of the drier areas for human consumption; (2) insufficient water and forage in some areas to meet overlapping requirements of wildlife and livestock; and (3) increasing human, livestock, and agricultural pressure on the land and water resources of some areas with consequent deterioration of the wildlife habitat. (Woodard-USGS)
W74-02627

2B. Precipitation

SEVERE FLOODS AT NEW BRAUNFELS, TEXAS, MAY 1972,
Soil Conservation Service, San Marcos, Tex.
For primary bibliographic entry see Field 02E.
W74-02173

HURRICANE AGNES FLOODS EAST MAHANTANGO CREEK,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 02E.
W74-02174

PSYCHROMETRIC DATA PATTERNS AND PREDICTION MODELS,
Wyoming Univ., Laramie. Water Resources Research Inst.
L. O. Pochop, S. A. Morton, and R. L. Cornia.
Available from the National Technical Information Service as PB-226 116, $3.00 in paper copy, $1.45 in microfiche. Water Resources Series No. 38, October 1973. 21 p, 6 fig, 7 tab, 9 ref. OWRR A-008-WYO (1). 14-31-0001-3851.

Descriptors: Water vapor, *Climatic data, Humidity, Air temperature, *Atmosphere, Hygrometry, Forecasting, *Wyoming, Model studies, Distribution patterns.
Identifiers: *Psychrometic data, *Prediction models.

Good psychrometric data are among the most difficult of all climatic parameters to obtain. However, uses of psychrometric data are numerous, especially in the field of water management. Results are presented of an investigation of the temporal and spatial patterns of the psychrometric data in Wyoming. Models for predicting psychrometric data from dry-bulb temperature, are included.
W74-02220

APPLICATION AND CONSEQUENCES OF PRECIPITATION OBSERVATIONS IN THE REPUBLIC OF SUDAN IN VIEW OF THE NOMADIC LIFE AND ECONOMY,
Southern Oregon Coll., Ashland. Dept. of Geography.
R. M. Hammer.
Geoform, No 14, p 11-18, 1973. 6 fig, 12 ref.

Descriptors: *Rainfall, *Satellites (Artifical), *Weather forecasting, Forages, Arid lands, *Climatic data, *Mapping.
Identifiers: *Sudan, Nomadism.

Rainfall data in Sudan reveal that 70 percent of the rainfall is produced by 25-30 percent of the storms. For agricultural purposes, where nomadism is an important factor in this arid country, forecasting occurrence of occasional heavy rain storms is of the utmost importance. Forage for livestock is dependent to a large extent on rainfall, and transhumance follows this pattern. Using satellite visible and infrared imagery, general rainfall conditions were verified, and daily rainfall determined. A series of maps showing the combined distribution of rainfall and clouds was produced, indicating that major cloud growth is associated with mountains and secondarily with water surfaces. (Paylore-Arizona)
W74-02348

AGROCLIMATIC AREAS FOR WHEAT AND BIOCLIMATIC CHARACTERISTICS OF ITS CULTIVARS IN URUGUAY, (IN SPANISH),
Buenos Aires Univ. (Argentina). Faculted de Agronomia y Veterinaria.
For primary bibliographic entry see Field 03F.
W74-02354

CALIFORNIA HIGH WATER, 1970-1971,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
For primary bibliographic entry see Field 02E.
W74-02474

STORM RAINFALL IN THE CARPATHIANS IN JUNE 1969,
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
P. M. Lyutik, and Ye. N. Kiptenko.
Soviet Hydrology: Selected Papers, No 5, p 417-425, 1971. 4 fig, 4 tab, 6 ref. Translated from Ukrainian Hydrometeorological Scientific Research Institute (Trudy UkrNIGMI), No 104, p 115-126, 1971.

Descriptors: *Storms, *Rainfall, Rainfall intensity, Runoff, Surface runoff, Storm runoff, Floods, Flood discharge, Runoff coefficient, Rainfall-runoff relationships, Mapping, Isohyets.
Identifiers: *USSR, *Carpathians.

Heavy rains in June 1969 produced disastrous floods in the Dniester, Prut, Seret, and Tisza River basins in the Eastern Carpathians. Continuous rainfall occured between June 7 and 10, amounting to 300 mm or more at many meteorological stations and exceeding normal June precipitation by a factor of 2-3. Maximum rainfall amounts were recorded during this storm at several meteorological stations in the Prut River basin (317 mm at Yablonovo and 397 mm at Kabaki). Total rainfall depth between June 7 and 10 over an area exceeding 22,000 sq km 100 mm or more. Largest amounts of rainfall occurred on northeastern slopes of the Carpathians and in the Ciscarpathians. Daily rainfall was heaviest in upper reaches of the Bystritsa Solotvinskaya River (239 mm), Bystritsa Nadvornyanskaya River (215 mm) and Prut River (173 mm). Daily rainfall was somewhat less (100-150 mm) in upper parts of the Seret, Cheremosh, Lomnitsa, Svicha, Stryy, and Tisza River basins. Daily rainfall was lowest (25-50 mm) in the Transscarpathians and in basins of the Tereblya, Rika, Latoritsa, and Uzh Rivers. Daily rainfall during the first ten days of June, changes in maximum rainfall depth and average rainfall intensity as a function of rainfall duration, and flood-runoff depths and coefficients for Carpathian Rivers are tabulated. (Josefson-USGS)
W74-02606

STORM RAINFALL IN THE BLACK SEA REGION AS A FACTOR IN SOIL EROSION,
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
N. I. Konovalova, and N. K. Mirotvorskaya.
Soviet Hydrology: Selected Papers, No 5, p 425-428, 1971. 2 fig, 3 tab, 5 ref. Translated from Ukrainian Hydrometeorological Scientific Research Institute (Trudy UkrNIGMI), No 104, p 134-138, 1971.

Descriptors: *Storms, *Rainfall, *Rainfall intensity, *Soil erosion, Slopes, Runoff, Overland flow, Probability, Equations.

Identifiers: *USSR, *Black Sea region.

Soil erosion in the southern Ukraine is greatly affected by storm rainfall. In the Ordinary Chernozem zone in the northwestern part of the Black Sea region, erosion can be produced by a rainfall intensity of about 1.0 mm/min and on strongly eroded slopes by a rainfall intensity of 0.7-0.8 mm/min. These heavy rains occur on an average of two to three times a year, and heavier rains with a maximum intensity of 2.0 mm/min occur once every three to five years. An increase in rainfall intensity sharply increases soil erosion. The effect of different rainfall intensities on runoff and erosion is graphed, and probable and maximum possible durations of downpours of different intensities are tabulated. (Josefson-USGS)
W74-02607

WATER RECYCLING OF SEWAGE EFFLUENT BY IRRIGATION: A FIELD STUDY ON OAHU,
Hawaii Univ., Honolulu. Water Resources Research Center.
L. S. Lau, P. C. E. Kern, P. Loh, R. H. F. Young, and G. L. Dugan.
Technical Report No. 62, November 1972. 89 p, 24 fig, 5 tab, 52 ref.

Descriptors: Rainfall, Rainfall disposition, *Rainfall intensity, Measurement, Climatology, Meteorology, *Climatic data, Irrigation, Recycling, *Water reuse, *Sewage effluents, *Hawaii.

Annual, monthly, and hourly rainfall data for Hilo, Hawaii are plotted and analyzed as a preliminary phase of the study of space-time variations in high intensity rainfall in this locality. A brief summary of the Hilo climate is provided. Annual rainfall amounts are shown to be highly variable, while the annual rainfall frequency remains relatively constant at about 33 percent. Monthly rainfall and maximum 24-hour rainfall amounts are displayed in the form of a monthly rainfall expectancy graph. Hourly rainfall amounts are divided into four intensity categories: 0.01 - 0.24, 0.24 - 0.49, 0.50 - 0.99 and > or equal to 1.00 inches per clock hour. The percentage distribution of annual and monthly rainfall amounts and frequencies by rainfall intensity category are plotted and discussed. Hourly data are displayed in a series of monthly diurnal distributions by rainfall intensity category. (Fullerton-Hawaii)
W74-02631

STATISTICAL ANALYSIS OF NORTH CAROLINA PRECIPITATION DATA,
North Carolina State Univ., Raleigh. Dept. of Geosciences.
C. K. Bayne, and A. H. Weber.
Preprint Proceedings of Third Conference on Probability and Statistics in Atmospheric Science, American Meteorological Society, June 19-22, 1973, Boulder, Colo. 2 p, 3 ref. OWRR A-061-NC (2). 14-31-0001-3833.

Descriptors: *Rainfall, *Precipitation (Atmospheric), *Droughts, *Frequency analysis, *Probability, Meteorology, *Markov processes, Statistical methods, Stochastic processes, *North Carolina, Climatic data.

Methodology for estimating probability of sequence of wet and dry days was applied to rainfall data from 48 stations in North Carolina. The procedure is based on 1st order Markov Theory, and includes variance of initial and transitional probabilities and confidence limits. (Howells-North Carolina)
W74-02632

2C. Snow, Ice, and Frost

EVAPORATION FROM SNOWDRIFTS UNDER OASIS CONDITIONS,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 02D.
W74-02183

MEASURING SNOWFALL, A CRITICAL FACTOR FOR SNOW RESOURCE MANAGEMENT,
Wyoming Univ., Laramie. Water Resources Research Inst.
P. A. Rechard, R. E. Brewer, and A. Sullivan.
Typescript, (1973). 10 p, 4 fig, 11 ref. NOAA 1-36055.

Descriptors: *Measurement, *Snowfall, *Snow management, *Computer models, Watershed management, *Gages, Instrumentation.

With the advent of detailed computer modeling techniques for determining the effects of watershed management practices, the ability to quantify the precipitation input is of critical importance. The measurement of precipitation in the form of snow is an observation task which to date has proven unsatisfactory. Under windy conditions the catch of snowfall by usual precipitation gages may be eighty percent in error. The findings of this study indicate that the catch of a gage placed in a manmade site shield utilizing the blowfence design, termed the Wyoming Shield, can duplicate that of a gage placed within a forested opening. The advantages of the Wyoming Shield are that it is always uniform, i.e. not subject to the natural variations in timber protection, it provides freedom of choice for siting a gage, and it is relatively inexpensive. As a general guide, unshielded gages catch per season from one-third to one-half the amount of precipitation that a well-protected gage in a forest opening catches. A gage with only a free swinging Alter-type shield catches from two-thirds to three-fourths the amount a well-protected gage catches, while a gage shielded with the Wyoming Shield configuration will catch about the same amount.
W74-02184

AN ENCLOSED WEIR FOR SMALL STREAMS IN SNOW COUNTRY,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 07B.
W74-02249

PREDICTING AVALANCHE INTENSITY FROM WEATHER DATA: A STATISTICAL ANALYSIS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
A. Judson, and B. J. Erickson.
Research Paper RM-112, August 1973. 5 fig, 3 tab, 5 ref.

Descriptors: *Avalanches, *Weather data, *Regression analysis, Statistics, Data collections, Forecasting, Snowpacks, Precipitation (Atmospheric), Winds, *Colorado, Storms.
Identifiers: *Avalanche forecasting.

Nineteen weather factors were analyzed to determine which have the highest correlation with avalanche activity. A simple two-parameter storm index and a discriminant function model were found to predict the likelihood of avalanches in Colorado's Forest Range. The storm index utilizes precipitation intensity modified by windspeed to predict the number of avalanches expected on 23 paths. The discriminant function model was used in conjunction with a multiple regression program to classify snow as stable or unstable on eight avalanche paths. This analysis shows that a linear combination of the maximum 3-hour precipitation intensities, windspeed resolved to an optimum direction for each path, and the sum of the negative temperature departures from 20 deg F could be used to determine whether a slope will avalanche 70% to 80% of the time. (Knapp-USGS)
W74-02294

EFFECTS OF HIGHWAY BRIDGE CONSTRUCTION ON A SUBARCTIC STREAM,
For primary bibliographic entry see Field 04C.
W74-02295

DETERMINATION OF THE MICROLEVEL TEMPERATURES DURING LAKE COOLING, ICE FORMATION, ICEMELT AND THE BREAK-UP OF THE ICE COVER OF A MOUNTAIN LAKE, HOLLAND LAKE, MISSOULA COUNTY,
Missoula. Dept. of Zoology.
L. G. Browman.
Available from the National Technical Information Service as PB-226 241 $2.75 in paper copy, $1.45 in microfiche. Montana University Joint Water Resource Research Center, Bozeman Report No. 40, (1973) 12p, 2 tab, 12 ref. OWRR A-04-MONT (1).

Descriptors: *Ice, *Lake Ice, *Melting, *Thawing, *Montana, *Temperature.
Identifiers: *Holland Lake (Mont), Ice formation, Microlevel temperatures, Ice breaking.

The primary objective was to determine the microlevel temperatures during lake cooling, ice formation, ice melt and the break-up of the ice cover of a mountain lake. The observations were carried out on Holland Lake, Montana which is located west of the Continental Divide at an elevation of 1,225 meters, is roughly 165 hectares in area with a maximum depth of 48 meters. It is a dimicitc, Oligotrophic lake surrounded by a complex of Douglas fillarch forest. (Holje-Montana)
W74-02447

COMBINED HEAT, ICE AND WATER BALANCES AT SELECTED GLACIER BASINS. PART II: SPECIFICATIONS, STANDARDS AND DATA EXCHANGE.

UNESCO/IASH Contribution to the International Hydrological Decade (Technical Papers in Hydrology, No 5); Paris, 1973. 32 p, 2 fig, 1 tab, 5 ref, append.

Descriptors: *Glaciohydrology, *Water balance, *Glaciology, *International Hydrological Decade, Water sources, Data collections, Heat, Ice, Melt water, Heat balance, Snow.
Identifiers: *Glacier basin hydrology.

The International Hydrological Decade (IHD) project concerned with the combined heat, ice, and water balances at selected glacier basins marks an important step in broadening the understanding of snow hydrology, high mountain and glacier hydrology, and the relation of glacier variations to changes in climate. The specific objective of the project is to obtain sufficient information to define and understand heat, ice and water blances and how they change with time at a number of glacier basins situated in widely differing environments in many parts of the world. Emphasis is on specifications and standards for types, locations, and timing of measurements, with particular attention given to heat balances. The intention is to provide a basis for international cooperation in attaining standardized measurements of all three glacier balances. This project is intimately linked to many other Decade projects such as the world inventory of perennial ice and snow masses, variations of existing glaciers and the world water balance. (Woodward-USGS)
W74-02470

ANTARCTIC LIMNOLOGY: A REVIEW,
R. B. Heywood.
Br Antarct Surv Bull. 29, p 35-65. 1972. Illus.
Identifiers: *Antarctic limnology, Climates, Geography, History, *Reviews, Cold regions.

Information on Antarctic inland waters is presented against a background of historical geographical, topographical, geological and climatic detail. Present knowledge suggests that aridity is the most important climatic factor determining the variety of lake and pool environments in Antarctica. Comparison with Arctic inland waters indicates that the considerably poorer biota of Antarctica largely reflects the isolation and the youth of the ecosystem. The review reveals the need for basic, comprehensive research program in all areas of the continent.--Copyright 1973, Biological Abstracts, Inc.
W74-02552

USE OF ERTS DATA FOR MAPPING SNOW COVER IN THE WESTERN UNITED STATES,
Environmental Research and Technology, Inc., Lexington, Mass.
For primary bibliographic entry see Field 07B.
W74-02603

EVALUATION OF ERTS IMAGERY FOR MAPPING AND DETECTION OF CHANGES OF SNOWCOVER ON LAND AND ON GLACIERS,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 07B.
W74-02604

THERMAL REGIME OF THE LOWER REACHES OF THE DANUBE RIVER IN AUTUMN AND WINTER,
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologidheskii Institut, Kiev (USSR).
A. V. Shcherbak, and L. I. Solopenko.
Soviet Hydrology: Selected Papers, No 5, p 414-417, 1971. 1 fig, 1 tab, 8 ref. Translated from Ukrainian Hydrometerorological Scientific Research Institute (Trudy UkrNIGMI), No 104, p 52-56, 1971.

Descriptors: *Ice, *Temperature, *Heat balance, *Water cooling, *Seasonal, Autumn, Winter, Air circulation, Synoptic analysis, Forecasting, Probability.
Identifiers: *USSR, *Danube River, Heat exchange.

Results are presented of investigations of the thermal regime of the Soviet reach of the Danube River in autumn and winter. Average long-period (1945-68) ten-day water temperatures in the reach are tabulated, and a relation of beginning dates of ice formation in the river at Izmail to the heat content of river water and the index of the combination of synoptic processes is graphed. The probability of early and late dates of ice formation is 89% and 83%, respectively. The relation obtained can be used to prepare a tentative forecast of development of ice phenomena in the Soviet reach of the Danube in autumn and winter. (Josefson-USGS)
W74-02605

A HYDROGEOTHERMAL DESCRIPTION OF GROUNDWATER IN UPPER CRETACEOUS DEPOSITS IN THE SOUTHEAST ARAL SEA AREA (GIDROGEOTERMICHESKAYA KHARAKTERISTIKA PODZEMNYKH VOD VERKHNEGO MELA YUGO-VOSTOCHNOGO PRIARAL'YA),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Seismologii.
For primary bibliographic entry see Field 02F.
W74-02609

EXPERIENCE IN A QUANTITATIVE ASSESSMENT OF ORGANIZATION OF SNOW COVER AS A NATURAL SYSTEM (OPYT KOLICHESTVENNOY OTSENKI ORGANIZATSII SNEZHNOGO POKROVA KAK PRIRODNOY SISTEMY),
E. G. Kolomyts.
Institut Geografii Sibiri i Dal'nego Vostoka Doklady, No 34, p 44-56, 1972. 6 fig, 1 tab, 16 ref.

Descriptors: *Snow cover, *Snow, *Crystals, *Estimating, *Statistical methods, Correlation analysis, Sublimation, Entropy, Winter, Curves, Maps.
Identifiers: *USSR, Siberia.

Snow cover is examined as a natural community of crystals of different sizes and shapes. This community has a definite degree of metamorphism, whose parameters are the complexity and degree of ordering of the snow layer and its individual horizons. A quantitative assessment was made of the degree of metamorphism of snow, based on the principles and techniques of the systems theory, the information theory, and the set theory. Relations suitable for calculating parameters of the organization of any natural systems are presented. A sketch map of the degree of metamorphism of snow cover in forested and adjoining regions of the USSR was constructed from an empirical relation of the measure of disordering of the snow layer to the magnitude of latitudinal continentality in winter in lowland and mountain taiga regions of West and East Siberia. (Josefson-USGS)
W74-02613

BEAR GLACIER HAS COME ALIVE (LEDNIK MEDVEZHIY OZHIL),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
L. D. Dolgushin.
Priroda, No 8, p 114-116, August 1973. 3 photo, 2 ref.

Descriptors: *Glaciers, *Lakes, *Movement, Ice, Snowmelt, Mountains, Alpine.
Identifiers: *USSR, *Bear Glacier, *Glacier surges.

The present advance of Bear (Medvezhiy) Glacier in Tadzhikistan was first detected on April 17, 1973. Initial reports indicated that the glacier terminus had already advanced a distance of 1,400-1,500 m and had divided the Abdukagor and Dustiroz Valleys. According to estimates, the glacier surge began no later than early March. By May 9 the glacier tongue, which was 150-200 m thick, had moved 1.5 km down valley along the Vanch River, advancing out to the Abdukagor Valley and forming a lake with an accumulation of 6-7 million cu m of water. The glacier terminus continued to move at a rate of 4-5 m a day, while the lake level rose at a rate of about 50-70 cm a day. By the end of May, about 9 million cu m of water had already accumulated in the lake. An outburst of the lake through its ice dam will produce severe flooding in the Vanch Valley and, possibly, a destructive mudflow, thereby endangering the Vanch Hydroelectric Station, bridges across the Vanch River, highways, powerlines, and a number of dwellings in the populated Vanch River Valley. According to the latest progress report (June 4, 1973), precautionary measures are being taken to protect the inhabitants and to prevent possible damage. The Pamir Alpine Expedition of the USSR Academy of Science's Institute of Geography and an expedition of the Tadzhik Administration of the Hydrometeorological Service are conducting systematic observations of the glacier advance and of the accumulation of water in the dammed lake. (Josefson-USGS)
W74-02614

HYPERBOLIC STRESS EQUATIONS FOR COMPRESSIBLE SLABS,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. I. Perla.
International Journal of Non-Linear Mechanics, Vol 8, p 253-259, 1973. 2 fig, 1 tab, 1 ref.

Descriptors: *Stress, *Snowpacks, *Equations, *Deformation, Compressive strength, Shear strength, Creep, Elastic theory.
Identifiers: *Snow mechanics.

In principle it is possible to formulate a system of stress equations for slabs composed of compressible materials such as snow. A constitutive law, chosen to model isotropic compressible slabs, is specialized for plane deformation and then substituted into the equations of motion. The resulting system is quasi-linear hyperbolic. Solutions depend on measurements of a deformation-rate parameter, D. The characteristics of the hyperbolic system span a distance 2DH, where H is the penetration of the characteristics into the slab. It is a feasible task to measure in situ the deformation or flow field of select portions of many types of slabs. For example, the flow field of a portion of a snow slab, which under body forces may compress to over 100% increase of density, is easily determined by following the movement of lightweight tracers (ping-pong balls, styrofoam plats, etc.) inserted into the slab. Slab stress can be inferred directly from such in situ measurements. (Knapp-USGS)
W74-02624

2D. Evaporation and Transpiration

EVAPORATION FROM SNOWDRIFTS UNDER OASIS CONDITIONS,
Wyoming Univ., Laramie. Water Resources Research Inst.
P. A. Rechard, and C. N. Raffelson.
Typescript, (1973). 10 p, 1 fig, 4 tab, 6 ref. NOAA 16-258-CA.

Descriptors: *Snowpacks, *Evaporation, *Wyoming, Measurement, Snowmelt.
Identifiers: *Pole Mountain (Wyo), *Snow fences.

It is possible to modify snow accumulation patterns by utilizing artificial wind barriers, such as snow fences. However, economical utilization of the snowdrifts requires that the resultant increase in water supply be obtained at a reasonable cost which assumes an ability to estimate the increase. To determine the quantity of increased water supply, it is necessary to know the amount of water lost from the drift through evaporation. A study to measure evaporation was conducted on Pole Mountain in southeastern Wyoming, wherein two snowdrifts were formed on top of butyl rubber mats behind two separate snow fences, each 8 feet high (2.4 m) x 100 feet (30 m) long. The water equivalents of the drifts were determined, and the quantity of runoff from the melting of the drifts was measured. Since there could be no infiltration, the difference between the water equivalency of the drift and the runoff was a measure of the evaporation, which during the one-month ablation period, was approximately 20-30 percent of the volume of the drift at the start of ablation. During the melt season the snowdrifts are 'oases' of snow, in that they are surrounded by bare ground. Because of this fact, and the extreme wind packing of the snow, existing models to compute evaporation are not adequate.
W74-02183

COMPARISON OF RAINGAUGE EVAPORATION SUPPRESSANTS,
Otago Univ., Dunedin (New Zealand). Dept. of Geography.
D. L. Murray.

Journal of Hydrology (New Zealand), Vol 11, No 2, p 99-104, 1972. 1 fig, 3 tab, 2 ref.

Descriptors: *Rain gages, *Evaporation control, Instrumentation, Equipment, Precipitation gages.

The efficiencies of two evaporation suppressants for protecting rain-gage catch are composed. Kerosene is inferior to light machine oil when high-precision data are required. Approximately 50 g of oil gave satisfactory evaporation suppression. (Knapp-USGS)
W74-02289

WATER REGIME OF SOLONCHAK SOLONETZES IN OPEN AREAS OF FORESTS IN THE NORTH CASPIAN SEA REGION, (VODNYY REZHIM SOLONCHAKOVYKH SOLONTSOV NA POLYANAKH LESNYKH NASAZHDENIY SEVERNOGO PRIKASPIYA),
For primary bibliographic entry see Field 02G.
W74-02301

A STUDY OF ITEMS IN THE GROUNDWATER BALANCE OF WATERLOGGED AREAS (OB UZUCHENII ELEMENTOV BALANSA GRUNTOVYKH VOD NO ZABOLOCHENNYKH UCHASTKAKH),
A. Yesenbekov.
Uzbekskiy Geologicheskiy Zhurnal, No 1, p 79-81, 1973. 2 fig, 1 tab, 4 ref.

Descriptors: *Evapotranspiration, *Evaporation, *Transpiration, *Saturated soils, *Lysimeters, Vegetation, Grasses, Plant growth.
Identifiers: *USSR.

Lysimeters filled with undisturbed soil samples 1.44 sq m in area and 2.0 m deep were used to determine total evaporation from waterlogged areas (with and without natural vegetation) in the Amu-Dar'ya Delta in 1967-70. Maximum evaporation from a bare waterlogged surface was observed during the hottest days of August (1967) and was 2,286.2 cu m/ha. Maximum evaporation from waterlogged areas covered by bulrushes (9,740.3 cu m/ha) was observed in July (1970). Maximum evaporation from an area of dry-valley grasses was 4,650 cu m/ha. Relation of total evaporation from waterlogged areas covered by bulrushes to their growth, and total evaporation from an area of dry-valley grasses at a water table depth of 0.5 m from the soil surface are graphed. (Josefson-USGS)
W74-02610

EVAPOTRANSPIRATION AND WATERSHED RESEARCH AS RELATED TO RIPARIAN AND PHREATOPHYTE MANAGEMENT--AN ABSTRACT BIBLIOGRAPHY.
Forest Service (USDA), Tempe, Ariz. Forest Hydrology Lab.

Available from GPO, Washington, DC 20402 Price $2.00. Forest Service Miscellaneous Publication No 1234, January 1973. J. S. Horton, Compiler, 192 p, 691 ref.

Descriptors: *Evapotranspiration, *Riparian water loss, *Phreatophytes, *Bibliographies, *Abstracts, Information retrieval, Publications, Water loss, Vegetation, Lysimeters, Climates, Environmental effects, Analytical techniques, Indexing, Energy budget.

Published information is presented that will help land managers and research workers to: (1) evaluate relations of vegetation to water loss and (2) estimate the probable effect on water yield of manipulating vegetation. The bibliography emphasizes moist-site vegetation, both phreatophyte and riparian, but watershed and plot studies are included if they can be useful in determining the effect of vegetation management on water yield. The development and use of various kinds of lysimeters are comprehensively reviewed to give a full picture of their value in determining evapotranspiration losses. Methods of estimating or measuring water losses (such as sap-flow instrumentation or the energy-budget approach) are given full coverage; even though in many cases the studies were carried out on agricultural lands, the methods might be adapted for use with moist-site vegetation. Articles on the various processes affecting evapotranspiration, including physiological, climatic, and general environmental processes are included if they have a direct bearing upon measurement of water loss in phreatophyte and riparian situations. The 691 references are arranged alphabetically by author within the subject-matter class. An author index gives item numbers. (Woodard-USGS)
W74-02630

2E. Streamflow and Runoff

LONG WAVES IN SHALLOW TRIANGULAR CHANNELS,
Wisconsin Univ., Madison.
T. Green.
Journal of Hydraulic Research, Vol 11, No 1, p 69-90, 1973. 12 fig, 17 ref.

Descriptors: *Waves (Water), *Flood waves, *Seiches, Mathematical studies, Tides, Surges, Bores.

Long waves travelling along rivers or channels were studied in a very simple analytical model which still preserves the desired characteristics of cross-channel depth variation and asymmetry: a straight, shallow channel of general triangular cross-section. A number of rivers have depth profiles which are somewhat triangular. Similar analytical techniques could be used to study waves in shallow channels of any prismatic cross-section. (Knapp-USGS)
W74-02158

SYSTEM 21, 'JUPITER' (A DESIGN SYSTEM FOR TWO-DIMENSIONAL NEARLY-HORIZONTAL FLOWS),
Danish Hydraulic Inst., Copenhagen. Computational Hydraulics Center.
For primary bibliographic entry see Field 07C.
W74-02159

A SHEAR PLATE FOR USE IN OSCILLATORY FLOW,
Queen's Univ., Kingston (Ontario). Coastal Engineering Research Lab.
P. H. Riedel, and J. W. Kamphuis.
Journal of Hydraulic Research, Vol 11, No 2, p 137-156, 1973. 9 fig, 16 ref.

Descriptors: *Unsteady flow, *Shear stress, *Waves (Water), *Instrumentation, Laminar flow, Turbulent flow, Roughness (Hydraulic), Data collections, Hydraulic models.
Identifiers: *Oscillating water tunnel.

A floating-element shear stress transducer provides an accurate means for measuring shear stress on smooth and rough beds under oscillatory flow. It is especially useful for measurements in oscillatory boundary layers because a knowledge of the boundary layer structure is not required. The instrument gives complete response to forcing functions with periods greater than 0.5 seconds and may be used to measure shear stresses in the range 0.015-100 N per sq m. Accurate computation of forces requires: (a) measurement of the pressure acting on the leading and trailing edges of the shear plate, (b) an assumption regarding the manner in which the pressure force acts on the roughness elements and (c) calibration of the shear plate for vertical load. (Knapp-USGS)
W74-02161

THE TURBULENT TEMPERATURE MIXING LAYER,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-02162

SEVERE FLOODS AT NEW BRAUNFELS, TEXAS, MAY 1972,
Soil Conservation Service, San Marcos, Tex.
A. B. Colwick, H. N. McGill, and F. P. Erichsen.
Paper No. 73-206 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 6 p, 12 fig, 2 tab.

Descriptors: *Texas, *Floods, *Rainfall intensity, Storms, *Excessive precipitation, Floodwater, *Flash floods.
Identifiers: *New Braunfels (Tex).

The flood-producing storm of May 11-12, 1972, in the New Braunfels, Texas, area is described in detail. Sixteen inches of rain fell in a 4-hour period. Fifteen lives were lost to the rampaging floodwaters that inundated 400 homes and caused approximately $5,700,000 in damages. (SCS)
W74-02173

HURRICANE AGNES FLOODS EAST MAHANTANGO CREEK,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
E. T. Engman, L. H. Parmele, and W. J. Gburek.
Paper No. 73-205 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 17 p, 9 fig, 1 tab, 11 ref.

Descriptors: *Pennsylvania, *Tropical storms, Excessive precipitation, *Rainfall intensity, Runoff, *Rainfall-runoff relationships, Watershed management.

The greatest rainfall amounts from the June 1972 tropical storm which devastated the Susquehanna River Valley occurred over the East Mahantango Creek Watershed, Pennsylvania. The rainfall intensities and peak runoff rates both surpassed the expected values for a 100-year event. In the latter part of the storm, data from the 7.8 sq km watershed indicate that runoff rates were approximately equal to the rainfall rates. (SCS)
W74-02174

TWO-DIMENSIONAL WAVES GENERATED BY A SURFACE PRESSURE DISTURBANCE OVER A SLOPING BEACH,
New York Univ., N.Y. Courant Inst. of Mathematical Sciences.
M. C. Shen.
Report No. IMM-NYU 342, NR 062-160, July 1965. 47 p, 4 fig, 12 ref, 2 append. ONR Nonr-285 (55), NSF-GP-3465.

Descriptors: *Coasts, *Beaches, *Waves (Water), Equations, *Shallow water, Pressure, Equilibrium.
Identifiers: Steady state problem, Transient problem.

Two-dimensional water waves generated by a prescribed pressure disturbance on the equilibrium surface of a uniformly sloping beach is studied by means of the Laplace transform technique applied to the equations of the linear theory. Both transient and steady problems are considered, and in each case the problem reduces to solving an inhomogeneous q-difference equation. The arbitrary constants in the solutions of the transient and the steady-state problem are determined by respectively imposing a boundedness condition and a radiation condition at infinity. The example of an oscillatory point pressure acting on the equilibrium surface of a 45 degree beach is worked out in

detail. It seems easier to derive the steady-state solution from the transient problem than to find it directly. (Sinha-OEIS)
W74-02187

INPUT SPECIFICATIONS TO STOCHASTIC DECISION MODELS,
Arizona Univ., Tucson. Dept. of Systems Engineering.
D. M. Clainos.
Available from NTIS as PB-226 091 $6.00 in paper copy, $1.45 in microfiche. M S Thesis, May, 1972. 60 p, append. OWRR A-024-ARIZ (8). 14-31-0001-3503.

Descriptors: *Decision making, *Stochastic processes, *Synthetic hydrology, Model studies, Mathematical models, Streamflow.
Identifiers: *Streamflow synthesis, Conditional dependency, Discrete matrices.

The use of discrete conditional dependency matrices as input to stochastic decision models is examined. Some of the problems and initial assumptions involved with the construction of the matrices are discussed. Covered in considerable detail is the transform used to relate the gamma space with the normal space. A new transform is introduced that should produce reasonable results when the record of streamflows (data) has a highly skewed distribution. Finally, the possibility of using the matrices to provide realistic inputs to a stochastic dynamic program is discussed.
W74-02209

ULTRASONIC RIVER FLOW MEASUREMENT,
Atomic Energy Research Establishment, Harwell (England).
W. R. Loosemore.
Ultrasonics, Vol 11, No 5, p 195-196, September 1973. 2 fig.

Descriptors: Flow measurement, *Flowmeters, *River flow, *Flow rates, *Instrumentation, *Ultrasonics, Automatic control, Data processing, Computers, Gages, Foreign research, Europe, Monitoring.
Identifiers: *United Kingdom (Thames River).

A brief description is given of a new ultrasonic flowmeter which measures total flow rates in rivers directly, automatically, and continuously. Measurements are made at preselected intervals, normally every 15 min, and the result is displayed locally in numerical form and then transferred to punched paper tape for computer input. Water level data, measured concurrently by a resistance gage, are automatically combined with the ultrasonically determined velocity to compute volume flow rates. The device was developed by the British Water Resources Board (WRB) and Atomic Energy Research Establishment. It was first installed in January 1973 at Clifton Reach on the Thames in cooperation with the Thames River Conservancy. (Brown-IPC)
W74-02250

MAPPING AVERAGE ANNUAL SURFACE WATER RESOURCES OF THE HYDROLOGICAL REGIONS OF NELSON, NEW ZEALAND,
Ministry of Works, Nelson (New Zealand). Water and Soil Div.
F. Scarf.
Journal of Hydrology (New Zealand), Vol 11, No 2, p 105-126, 1972. 7 fig, 2 tab, 8 ref, 3 append.

Descriptors: *Mapping, *Data collections, *Hydrologic data, Water resources, Water yield, Stream gages, Streamflow forecasting.
Identifiers: *New Zealand (Nelson).

A method for mapping average annual water resources is based on the hydrological region concept. River gaging data from temporary sites are correlated with concurrent data from representative basins or other long-term recording sites. A comparison is made between results obtained using a simple water balance approach and those obtained by gaging and correlation. Use of the correlation equations for evaluating other flow characteristics such as minimum flow and flow duration for previously ungaged sites is discussed briefly. The average annual pattern of surface water resources for the Nelson district, New Zealand, is presented using this method. (Knapp-USGS)
W74-02290

RIVER REGIMES IN IRAN,
Durham Univ. (England). Dept. of Geography.
P. Beaumont.
Durham University Department of Geography Occasional Publications (New Series), No 1, 1973. 29 p, 11 fig, 2 tab, 23 ref.

Descriptors: *Streamflow, *Flow rates, *Hydrologic data, Foreign countries, *Drainage area, Topography, Rainfall-runoff relationships, Hydrographs, Correlation analysis, Mountains, Snowmelt, Reviews, Evaluation.
Identifiers: *Iran, River regimes.

The drainage systems of Iran can be divided into Caspian Sea drainage, Persian Gulf drainage and drainage into the central part of the country. The first and last regions are areas of interior drainage. Winter is the rainy season in Iran, during which period at least two-thirds of the country receives more than half its annual precipitation total. The regime hydrographs of 45 rivers reveal marked similarities, with peak discharges occurring mainly in the period Esfand through Ordibehesht (March through May), owing largely to the effect of snowmelt. Analysis of the river regimes broad hydrographic regions which differ from the three major groupings based on direction of drainage. The largest runoff values per unit area occur in the northern and central parts of the Zagros Mountains and in the Elburz Mountains. The lowest runoff values are in a belt around the desert regions of central Iran. (Woodard-USGS)
W74-02298

SURFACE AND INTERNAL WAVES, (POVERKHNOSTNYYE I VNUTRENNIYE VOLNY),
Akademiya Nauk URSR, Sevastopol. Marine Hydrophysics Inst.
L. V. Cherkesov.
Izdatel'stvo 'Naukova Dumka', Kiev, 1973. 248 p.

Descriptors: *Waves (Water), *Internal waves, *Gravity waves, *Ocean waves, *Tsunamis, Energy, Celerity, Viscosity, Density, Pressure, Atmospheric pressure, Depth, Surfaces, Interfaces, Ice-water interfaces, Ice cover, Fluid mechanics, Curves, Equations, Investigations.
Identifiers: USSR, *Surface waves.

Theoretical studies were made of surface and internal gravity waves generated by impulsive, periodic, and traveling disturbances. Examined are tsunami waves caused by submarine earthquakes, internal waves produced by periodic and traveling atmospheric pressures in a continuously stratified sea, and effects of viscosity and discontinuity of density at the water-ice interface on gravity waves. (Josefson-USGS)
W74-02299

PROBABILITY ANALYSIS IN AN APPROXIMATE THEORY OF MOVEMENT OF WATER MASSES, (VEROYATNOSTNYY ANALIZ V PRIBLIZHENNOY TEORII PEREMESHCHENIYA VODNYKH MASS),
Tomsk State Univ. (USSR).
D. A. Burakov.
Meteorologiya i Gidrologiya, No 4, p 52-58, April 1973. 2 fig, 8 ref.

Descriptors: *Statistical methods, *Frequency analysis, *Probability, *Distribution, Variability, Curves, Equations.
Identifiers: USSR, *Traveltime, Pearson distributions.

The probabilistic approach was applied to an interpretation and determination of traveltime. The traveltime curve, which is widely used in flood hydrograph computations, can be considered as a probability density function of traveltime of a volume element of water. To analytically express a traveltime curve, distribution curves of random variables, such as the curve for the Pearson Type III distribution, can be used. The shape of the traveltime curve is determined by statistical parameters which have a clear physical meaning. (Josefson-USGS)
W74-02305

COMPUTER SIMULATION OF STORM WATER RUNOFF,
Northwestern Univ., Evanston, Ill. Technological Inst.
F. F. Offner.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10216, p 2185-2194, December 1973. 4 fig, 5 ref.

Descriptors: *Computer programs, *Rainfall-runoff relationships, *Urban hydrology, *Storm runoff, Urban runoff, *Simulation analysis, Rational formula.

A computer program eliminates most of the intuition or experience required in calculating stormwater runoff by the classical rational method. The program gives an approximate solution of the partial differential flow equation over the area. The area considered is divided into a grid of squares, with the elevation and soil condition (flow coefficient, initial surface retention, infiltration rate) tabulated for each grid element; often all these may be considered constant except elevation. Typical rainfall data are entered, and the program gives the runoff into drainage lines as a function of time. Depth of water standing in the area is also computed. Copies of the program are available. (Knapp-USGS)
W74-02310

DAM-BREAK FLOOD IN A PRISMATIC DRY CHANNEL,
California Univ., Davis. Dept. of Engineering.
For primary bibliographic entry see Field 08B.
W74-02311

FLOW IN OPEN CHANNELS WITH SMOOTH CURVED BOUNDARIES,
Pahlavi Univ., Shiraz (Iran). Dept. of Engineering.
For primary bibliographic entry see Field 08B.
W74-02312

DAMPING OF WATER WAVES OVER POROUS BED,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
P. L-F. Liu.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10218, p 2263-2271, December 1973. 1 tab, 14 ref, append.

Descriptors: *Waves (Water), *Porous media, *Alluvial channels, Viscosity, Sands.
Identifiers: *Damping (Water waves).

Based on linearized Navier-Stokes equations and Darcy's equations, the viscous damping of small amplitude surface waves over a permeable bed is examined. Boundary layer approximation is employed to solve the velocity field and pressure

field. By requiring that the net dissipation per period must be balanced by the slow decay of wave energy, the damping rate is found. Theory agrees fairly well with experimental results. The damping rate of a simple harmonic gravity wave over a permeable bed was studied using the boundary layer approximation. There are two possible modes of oscillation. If the porosity term is neglected, then there is only one possible mode of oscillation which is the same as that of a progressive wave over an impermeable bed. (Knapp-USGS)
W74-02315

ELEVATION DEPENDENT MODEL FOR ESTIMATING ANNUAL RUNOFF,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 02A.
W74-02317

FIELD TESTS ON TRANSVERSE MIXING IN RIVERS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W74-02318

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE HOUSTON, TEXAS METROPOLITAN AREA, 1971,
Geological Survey, Austin, Tex.
D. E. Ferguson.
Open-file report (Texas District), May 1973. 244 p, 16 fig, 14 tab, 2 ref.

Descriptors: *Urban hydrology, *Hydrologic data, *Storm runoff, *Rainfall-runoff relationships, *Texas, Cities, Watersheds (Basins), Basic data collections, Streamflow, Gaging stations, Flow rates, Reservoir storage.
Identifiers: *Houston (Tex).

Hydrologic investigations of urban watersheds in Texas were begun by the U.S. Geological Survey in 1954. This report, the eighth in a series of reports to be published annually, presents the basic hydrologic data collected in the Houston urban area for the 1971 water year (October 1970 to September 1971). Rainfall for the year was unevenly distributed over the area. Individual station totals ranged from 29.2 inches at the Sims Bayou at Hiram Clarke Street gage to 49.8 inches at the Houston-Alief rain gage. The largest amounts of rainfall for an individual storm were 7.15 inches at the Houston-Alief rain gage and 6.25 inches at the Stafford rain gage on October 11. Runoff data are based on discharge measurements and stage records at 16 continuous-record stream-gaging stations, 16 partial-record stream-gaging stations, and two reservoir-content stations. Annual records of daily discharges at continous-record stream-gaging stations, maximum discharge at crest-stage partial-record stations, and daily contents of reservoirs are given. The high-runoff periods of the 1971 water year occurred during October 1970, and August and September 1971. Only a small amount of runoff resulted from rainfall during the intervening months. (Woodard-USGS)
W74-02471

CALIFORNIA HIGH WATER, 1970-1971,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
D. E. Martfeld, and W. A. Arvola.
Available from State of Calif., Dept. of Water Resources PO Box 388, Sacramento, Calif. 95804, Price $2.00. Bulletin No 69-71, September 1972. 51 p, 22 fig, 3 tab.

Descriptors: *Water resources, *Weather patterns, *Hydrologic data, *Peak discharge, *California, Precipation (Atmospheric), Streamflow, Runoff, Floods, Rainfall, Snow, Flood control, Reservoirs, Water levels, Discharge (Water), Stage-discharge relations.

The weather pattern in California for water year 1970-71 was marked by extremes that set several weather records. The year held the wettest November for San Francisco and Stockton, the longest winter drought at Red Bluff, the heaviest 24-hour rainfall in southern California, and the deepest snowpack at Norden in December and January. A series of storms hit the North Coastal Hydrographic Area from October through December, causing flood stages on some rivers. The San Francisco Bay Hydrographic Area was drenched by November storms that dropped almost three inches of rain on San Francisco and more than 4 iches of rain on Marin County in one 2-day period. Heavy local runoff resulted in both areas, with the Napa River near St. Helena rising 9 feet in 9 hours. No streams exceeded flood stage. November and December were very wet months in the Central Valley Hydrographic Area and large amounts of snow were deposited in the Sierra Nevada in December. The Central Valley had little rain from January to March, when a new series of storms brought heavy rain to the mountains. Both Shasta and Oroville Reservoirs prevented downstream flooding. In February a severe earthquake centered in San Fernando Valley extensively damaged the Upper and Lower San Fernando Dams. (Woodard-USGS)
W74-02474

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE ELM CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex. Water Resources Div.
B. B. Hampton.
Open-file report (Texas District), July 1973. 47 p, 2 fig, 2 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Texas, *Erosion control, Basic data collections, Rainfall-runoff relationships, Streamflow, Flow rates, Gaging stations Rain gages, Storms.
Identifiers: *Trinity River basin (Tex.), Little Elm Creek (Tex), Aubrey (Tex.).

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. Hydrologic investigations of small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 areas. This report, which is the 12th in a series of basic-data reports published annually for the Little Elm Creek study area, contains the rainfall, runoff, and storage data collected during the 1971 water year for the 75.5-square-mile area above the stream-gaging station Little Elm Creek near Aubrey, Texas. The locations of floodwater-retarding structures and hydrologic-instrument installations in the area are shown. Sixteen floodwater-retarding structures have a combined capacity of 12,340 acre-feet below the emergency spillway and control runoff from 35.7 square miles, or 47% of the area above the Aubrey stream-gaging station. Average rainfall during the 1971 water year was 24.52 inches, or 67% of the 15-year (1957-71) average of 36.55 inches for the area. The yearly mean discharge at the stream-gaging station near Aubrey was 3.89 cfs. The runoff for the year was 2,810 acre-feet (0.70 inch). (Woodard-USGS)
W74-02477

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR CALAVERAS AND ESCONDIDO CREEKS, SAN ANTONIO RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex. Water Resources Div.
R. D. Steger.
Open-file report (Texas District), 1973. 74 p, 3 fig, 4 tab.

Descriptors: *Hydrologic data, *Small watersheds, *Erosion control, *Texas, *Rainfall-runoff relationships, Storms, Flood control, Soil conservation, Data collections, Flood protection, Engineering structures, Hydrographs, Mass curves, Rain gages, Gaging stations.
Identifiers: *San Antonio River basin (Tex), Calaveras Creek, Escondido Creek.

The U. S. Soil Conservation Service is actively engaged in the installation of flood and soil-erosion reducing measures in Texas. As part of this project, hydrologic investigations of small watersheds were begun by the Geological Survey in 1951 and are now being made in 12 study areas. The mean rainfall in the Calaveras Creek study area for the 1971 water year was 20.58 inches, or 75% of the 17-year (1955-71) average. The mean annual rainfall (1931-60) at the NationalWeather Service at Karnes City is 31.93 inches. The average rainfall over the Escondido Creek study area for the 1971 water year was 19.59 inches. Only one storm was selected for detailed computations. These computations include detailed time breakdown of rainfall and discharge. Hydrographs and mass curves are drawn for illustrations. A summary of rainfall-runoff data for the storm is shown. (Woodard-USGS)
W74-02478

FLOOD OF JUNE 1972 AT CORNING, NEW YORK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-02479

APPLICATION OF ERTS-1 IMAGERY TO FLOOD INUNDATION MAPPING,
Iowa State Geological Survey, Iowa City. Remote Sensing Lab.
For primary bibliographic entry see Field 07B.
W74-02591

ASSESSMENT OF FLOOD DAMAGE IN ARIZONA BY MEANS OF ERTS-1 IMAGERY,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 07B.
W74-02592

MONITORING OF STREAMFLOW IN THE VERDE RIVER BY ERTS-1 DATA COLLECTION SYSTEM (DCS),
Geological Survey, Phoenix, Ariz. Water Resources Div.
For primary bibliographic entry see Field 07B.
W74-02594

PRELIMINARY EVALUATION OF ERTS-1 FOR DETERMINING NUMBERS AND DISTRIBUTION OF PRAIRIE PONDS AND LAKES,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07B.
W74-02597

DYNAMICS OF PLAYA LAKES IN THE TEXAS HIGH PLAINS,
Texas Tech Univ., Lubbock. Dept. of Geosciences.
For primary bibliographic entry see Field 07B.
W74-02598

STORM RAINFALL IN THE CARPATHIANS IN JUNE 1969,
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02B.
W74-02606

FLOODS AT MARTINSBURG AND VICINITY, WEST VIRGINIA,
Geological Survey, Washington, D.C.
G. S. Runner, and E. A. Friel.
Hydrologic Investigations Atlas HA-427, 1 sheet, 1973. 8 fig, 1 map, 2 ref.

Descriptors: *Floods, *Flood data, *West Virginia, Hydrologic data, Historic floods, Streamflow, Runoff, Flow rates, Gaging stations, Peak discharge, Flood profiles, Flood frequency, Maps, Planning, Land use, Aerial photography, Appalachian Mountain Region.
Identifiers: *Martinsburg area (W Va).

This one-sheet atlas was prepared to further the objectives of the Appalachian Regional Commission. It presents hydrologic data concerning the extent, depth, and frequency of flooding that are useful for an appraisal of the hazards involved in occupancy and development of flood plains along Opequon and Tuscarora Creeks in the vicinity of Martinsburg, West Virginia. It will aid those who are responsible for making decisions for the safe and economical use of floodplain lands along these creeks. The data will be useful for preparing building and zoning regulations, developing recreational areas, and purchasing and developing unoccupied land for various uses. The map and flood data provide a technical basis for making decisions leading to land uses compatible with the degree and frequency of flooding expected. The approximate boundaries of inundation on Opequon and Tuscarora Creeks by hypothetical floods having recurrence intervals of 5,25, and 50 years are delineated on an aerial photomosaic map. Depths of inundation and limits of overflow of floods of various magnitudes can be estimated by using the methods and relations presented. (Woodard-USGS)
W74-02615

FLOOD CONTROL PROJECT MAINTENANCE AND REPAIR--1970 INSPECTION REPORT,
California State Dept. of Water Resources, Sacramento.
J. F. Wright, Jr., and J. MacClanahan.
Available from State of Calif, Documents Section, P.O. Box 20191, Sacramento, Calif. 95820 Price $2.00. Bulletin No 149-70, May 1971. 30 p, 2 fig, 8 tab.

Descriptors: *Flood control, *Levees, *River basins, *California, Engineering structures, Maintenance, Channel improvement, Check structures, Flood protection, Maps, Sites, Erosion control, Vegetation, Projects, Network design.
Identifiers: *Sacramento and San Joaquin Valleys (Calif.).

In 1970, flood control levees extending 1,537 miles were operated under cooperative state and federal agreements in the Sacramento and San Joaquin Valleys and in Lake and Placer Counties, Calif. Flood control projects include the Sacramento, American, San Joaquin, Calaveras, and Truckee Rivers; Littlejohns and Middle Creeks; Merced County Stream Group; Sacramento River Bank Protection Project, and the Lower San Joaquin Flood Control Project; and the Fresno County Stream Group. Twice during 1970, Department of Water Resources specialists rated the quality of levee maintenance performed by local maintaining agencies. This bulletin reports both the 1970 ratings and the method of rating, discusses proper maintenance procedures, and reports levee construction by the U. S. Army Corps of Engineers, channel maintenance, applications for levee encroachments, and the condition of the flood control project structures. Maps locate project levees and local maintenance agencies. (Woodard-USGS)
W74-02617

WATER RESOURCES OF THE BIG SIOUX RIVER VALLEY NEAR SIOUX FALLS, SOUTH DAKOTA,
Geological Survey, Washington, D.C.
D. G. Jorgensen, and E. A. Ackroyd.
Available from GPO, Washington, DC 20402 Price $2.05 (paper copy). Water-Supply Paer 2024, 1973. 50 p, 22 fig, 6 tab, 27 ref.

Descriptors: *Water resources, *Hydrologic data, *Surface waters, *Groundwater resources, *South Dakota, Hydrogeology, Aquifer characteristics, Water wells, Withdrawal, Water yield, Water quality, Streamflow, Base flow, Water supply, Projections, Model studies, Surface-groundwater relationships.
Identifiers: *Big Sioux River Valley (S Dak), *Sioux Falls (S Dak).

The major sources of water in the Big Sioux River Valley between Sioux Falls and Dell Rapids, S. Dak., are the Big Sioux River and the glacial outwash aquifer beneath the flood plain. The river and the aquifer are hydraulically connected. To evaluate the importance of the aquifer in the hydrologic system, both an electrical analog and a digital model were programmed for storage depletion alone. These models were used to determine the water-level declines in the aquifer that would result from 1 year of withdrawal at a rate of 9-10 million gallons per day. Both models indicated that the existing well field can yield water at that rate for more than 1 year. The analog model was also used to determine the maximum average daily yield of the aquifer-river system for a 2-year period modeled for the minimum recorded stream discharge and for streambed infiltration as the only recharge. The maximum average yield under these conditions would be less than 24 mgd. Most of the water pumped during this period would be from aquifer storage. Water from the river is generally less mineralized, softer, and easier to treat than groundwater. Water pumped from wells near the river is similar in quality to the river water, but does not have the objectionable odors or tastes often present in water from the river. (Woodard-USGS)
W74-02619

NEW VISTAS FOR FLOOD INVESTIGATIONS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
V. Yevjevich.
Accademia Nazionale Dei Lincei, Rome, Problemi Attuali di Scienza e di Cultura, Quaderno No 169, p 515-546, 1972. 25 fig, 8 ref.

Descriptors: *Floods, *Flood forecasting, *Flood frequency, *Mathematical studies, Equations, Hydrologic data, Methodology, Flood data, Rainfall, Runoff, Statistical methods, Probability, Hydrographs, Mass curves.

Mathematical approaches to flood data investigations are described under the following main categories: properties of basic data for analysis of floods; general properties of floods; extraction of information on floods from rainfall data; extraction of information on floods from runoff data; prediction of floods; probability distribution of floods; and statistical inference for flood events. (Woodard-USGS)
W74-02625

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR GREEN CREEK, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 04D.
W74-02626

DETAILED ANALYSIS OF SHORT-TERM VARIATIONS IN BEACH MORPHOLOGY (AND CONCURRENT DYNAMIC PROCESSES) FOR SUMMER AND WINTER PERIODS, 1971-1972, PLUM ISLAND, MASSACHUSETTS,
Massachusetts Univ., Amherst. Coastal Research Center.
R. W. Abele, Jr.
Available from NTIS as AD-759 513. Final Report prepared for Department of the Army, November 1972. 174 p, 59 fig, 1 tab, 23 ref. DACW72-71-C-0023.

Descriptors: *Massachusetts, *Waves (Water), *Beach erosion, Ocean waves, Atmospheric pressure, Intertidal areas, Water level, Storms, *Sediment transport, *Shallow water, *Geomorphology, Coasts, Barrier islands, *Meteorology.
Identifiers: *Plum Island (Mass), Breakers, Longshore currents, Nearshore bars, Air-sea interaction.

An analysis of the relationship between wave and meteorological variables and beach morphology was undertaken during summer and winter periods, 1971 and 1972, on Plum Island, Massachusetts. Fifteen variables were measured or computed bihourly, twenty-four hours per day, throughout both study periods. These variables were wave period, wave height, breaker type, breaker angle, longshore current velocity, wave steepness, breaker power, wind speed and direction, barometric pressure, air and water temperature, and ground-water elevation. Daily topographic maps of the intertidal zone were constructed for twelve beach profiles spaced at 60-m intervals. Variations in beach process variables, during both the summer and winter periods, were directly related to the passage of high- and low-pressure systems and to the proximity of the system to Plum Island. With an increase in breaker power and breaker steepness, the high-tide beachface gradient increased. Increases in breaker power also resulted in a rise in the level of the ground-water surface. Although most process variables operated in a similar fashion for the summer and winter periods, strong offshore winds and extreme low temperatures that accompany polar high-pressure systems are unique to the winter period. Differences in beach morphology within a small area appear to reflect the state of recovery of the beach profiles following a storm. Adjacent profiles at different stages of maturity are controlled by the proximity of the nearshore bar. The closer the bar is to shore, the more quickly sediment can be returned to the beach zone following a storm. (Sinha-OEIS)
W74-02649

2F. Groundwater

GROUND WATER SEEPAGE PATTERNS TO WELLS FOR UNCONFINED FLOW--PHASE II,
Iowa State Water Resources Research Inst., Ames.
M. Y. Khan, and D. Kirkham.
Available from NTIS as PB-226 089 $5.50 in paper copy, $1.45 in microfiche. Completion Report ISWRRI-57, August 1973. 63 p, 12 fig, 9 tab, 22 ref. OWRR B-019-IA (5).

Descriptors: *Aquifers, *Groundwater movement, *Ditches, *Free surfaces, *Saturated flow, Model studies, Equations, Computer programs, Hydraulic conductivity, Analytical techniques.
Identifiers: *Parallel ditches, Unconfined flow, Two-dimensional groundwater mounds, Three-dimensional groundwater mounds.

Analytical methods have been developed, for steady-state unconfined flow, for determining the exact location of the free surface in a two-dimensional flow of groundwater between two parallel ditches. The analysis considers flow in a saturated region below the watertable; capillary effects are neglected. The analysis of a two-dimensional flow can be carried over to determine the location of the free surface in a three-dimensional axisymmetric flow toward a well. The solution has been obtained from potential theory by solving Laplace's equation to satisfy an appropriate set of boundary conditions using a modified Gram-Schmidt technique and a simple iterative scheme. The solution is given in the form of a potential function and

a stream function. These functions can be used to determine the exact location of the free surface and to draw flownets. Computer programs have been developed to determine the location of the free surface and to draw flownets. Several flownets are presented. (See also W70-02759) (Woodard-USGS)
W74-02206

STRONTIUM, CALCIUM AND THE ISOTOPIC COMPOSITION OF STRONTIUM IN UNDERGROUND WATERS FROM THE SCIOTO RIVER BASIN, OHIO,
Miami Univ., Oxford, Ohio. Dept. of Geology.
A. M. Stueber, A. D. Baldwin, M. Ikramuddin, and P. Pushkar.
Available from the National Technical Information Service as PB-226 104, $3.00 in paper copy, $1.45 in microfiche. Final Report, 1973. 38 p, 7 fig, 5 tab, 11 ref. OWRR A-030-OHIO (1). 14-31-0001-3835.

Descriptors: *Groundwater, *Isotope studies, *Strontium, *Tracers, Groundwater-surface relationships, *Ohio, Tagging, Provenance, Glaciohydrology.
Identifiers: *Scioto River basin (Ohio), Sr/Ca ratios, Celestite.

A total of 27 ground-water samples from the Scioto River drainage basin, Ohio has been analyzed for Sr and Ca concentrations and Sr-isotopic compositions. Ground waters which emanate from carbonate bedrock are characterized by 87Sr/86Sr ratios in the range 0.708-0.709; unusually high Sr/Ca ratios in these waters identify celestite lenses within the carbonate as the dominant source of Sr. Underground waters from clastic bedrock, principally shale, have 87Sr/86Sr ratios which vary from about 0.710 to about 0.713, and low Sr/Ca ratios. Thus there are two basic ground-water types from bedrock within the basin which can be identified by these two parameters. Most ground waters that have been in contact only with glacial overburden, which covers the northern two-thirds of the basin, have carbonate-type 87Sr/86Sr ratios as well as high Sr/Ca ratios. Celestite is apparently present in the till throughout much of the Scioto basin. Ground waters containing celestite-derived Sr, whether from the carbonate bedrock or the glacial overburden, have such high strontium concentrations as to completely establish the 87Sr/86Sr ratios of surface waters north of the glacial boundary and limit the usefulness of this parameter as a tracer in water studies within the basin.
W74-02218

FLOW ANALYSIS OF HYDRAULIC CONNECTORS IN ARTIFICIAL RECHARGE SYSTEMS, A MODEL STUDY,
Ohio State Univ., Columbus. Water Resources Center.
For primary bibliographic entry see Field 04B.
W74-02219

SATURATED-UNSATURATED SEEPAGE BY FINITE ELEMENTS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Soil and Water.
For primary bibliographic entry see Field 02G.
W74-02313

DAMPING OF WATER WAVES OVER POROUS BED,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 02E.
W74-02315

STUDIES ON SEEPAGE FROM CANALS WITH PARTIAL LINING,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W74-02319

GEOLOGIC CONTROL OF GROUND WATER MOVEMENT IN A PORTION OF THE DELAWARE PIEDMONT,
Delaware Univ., Newark. Dept. of Geology.
R. R. Jordan, and W. M. Leis.
Available from the National Technical Information Service as PB-226 093, $2.75 in paper copy, $1.45 in microfiche. Completion Report, October 1973. 19 p, 8 fig, 2 tab, 7 ref. OWRR A-021-DEL (1). 14-31-0001-3808.

Descriptors: *Groundwater movement, *Structural geology, Magnetic studies, Seismic studies, Delaware, *Permeability, Pumping, *Porosity, *Exploration, *Geologic control, Geophysics.
Identifiers: *Delaware Piedmont, Axes of permeability, Residual magnetics.

Geologic and geophysical exploration as well as pumping tests in the Delaware Piedmont define two axes of permeability in ground-water flow. The predominant axis parallels strike of regional foliation with conduits provided by sheet joints. Zones of relatively high secondary porosity were defined based upon study techniques.
W74-02320

A GUIDE TO IMPORTANT CHARACTERISTICS AND VALUES OF FRESHWATER WETLANDS IN THE NORTHEAST.
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
For primary bibliographic entry see Field 04B.
W74-02324

USE OF DIGITAL COMPUTER TECHNIQUES IN WATER RESOURCES DATA STORAGE,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 04B.
W74-02357

THE ROLE OF DEFORMATION IN CHANGING THE RESERVOIR PROPERTIES OF AQUIFERS,
Montana Univ., Missoula. Dept. of Geology.
G. W. Crosby.
Available from National Technical Information Service as PB-226 197 $3.00 in paper copy, $1.45 in microfiche. Research Report No. 42, Montana University Joint Water Resources Research Center, Bozeman, (1973) 8 p, 3 fig. OWRR A-036-MONT (1).

Descriptors: Groundwater, *Deformation, *Aquifer characteristics, *Hydrogeology, *Groundwater reservoirs, *Montana.
Identifiers: *Sawtooth Range (Mont).

The purpose has been to quantitatively determine the role of deformation in changing the physical properties of rocks: more specifically, an attempt has been made to assess the possible damage by deformation to aquifers. The near subsurface of perhaps 25 percent of the area of the United States consists of moderate to severely deformed rocks. Moreover, much of the dry southwest is underlain by deformed strata, and lacking surface water, the location of groundwater reserves is of considerable economic importance. The investigation was undertaken in the disturbed belt adjacent to the Sawtooth Range in Montana. The disturbed belt is a transition zone from flat-lying underformed strata of the plains to severely deformed rocks of the fold and thrust belt in the Sawtooth Range. (Holje-Montana)
W74-02446

A CONJUNCTIVE USE SURFACE WATER--GROUND WATER SIMULATOR,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Geoscience.
W. Brutsaert, and C. Way.
Available from the National Technical Information Service as PB-226 254, $3.50 in paper copy, $1.45 in microfiche. New Mexico Water Resources Research Institute Partial Technical Completion Report No 033, November 1973. 56 p, 9 fig, 1 tab, 7 ref, append. OWRR A-045-NMEX (1).

Descriptors: *Computer models, *Aquifers, *Conjunctive use, *Computer simulation, *Groundwater flow, Groundwater recharge, Groundwater, Unconfined aquifers, Seepage, Leakage, Phreatophytes, Precipitation, Storage coefficient, Hydraulic conductivity.
Identifiers: *Rio Grande Region, *Gauss-Elimination, *Line successive over relaxation, New Mexico, Continuous and descretized mass balance, Thomas Algorithm, Residual approach.

As part of an interdisciplinary analysis of the economic evaluation of the water resources of the Rio Grande Region of New Mexico, a conjunctive use surface water-ground water simulator was developed. The simulator was used to determine the dynamic availability of ground water and its relationship to flow in the Rio Grande. The structure and use of the simulator are described. The simulator is a computer model in which the governing nonlinear parabolic partial differential equation, used to simulate unconfined aquifer flow in two dimensions, was solved by implicit finite differences. The set of difference equations in residual form are solved by the line successive over relaxation method or Gauss Elimination depending upon the size of the problem. (Welker-New Mexico)
W74-02452

DISPERSION OF SUBSTANCES FROM WELL RECHARGE OPERATIONS IN AN ANISOTROPIC, HOMOGENEOUS CONFINED AQUIFER,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
J. A. Hoopes, P. L. Monkmeyer, and Q. N. Fattah.
Available from the National Technical Information Service as PB-226 287, $3.50 in paper copy, $1.45 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, 1973. 52 p, 15 fig, 35 ref, 2 append. OWRR A-043-WIS (1) 14-31-0001-3550 and 14-31-0001-3850.

Descriptors: *Dispersion, *Recharge wells, *Anisotropy, Water quality, Waste water disposal, Homogeneity, *Porosity, *Aquifers, Model studies, *Groundwater movement.

The first part of the investigation concerns the development of experessions which related the dispersion coefficient for flows through anisotropic, homogeneous porous media to the fluid, flow, and media properties. These expressions are developed from one-dimensional flow experiments on an anisotropic media model constructed of thin alternating layers of different sized sand. In the second part of the study, dispersion of substances in the flow from a partially-penetrating, recharge well through a confined homogeneous, anisotropic aquifer is investigated. Theoretical distributions of a substance added to the steady flow from the well are being determined from numerical solutions of the mass conservation equation, where the flow field is determined from potential flow analysis and dispersion coefficients are obtained from the results of the first part of the investigation. Measurements of a tracer distribution will be carried out on a laboratory model, consisting of a cylindrical element of anisotropic porous media constructed as described above, and compared to the theoretical predictions. From these results, the importance of dispersion in flow through anisotropic confined aquifers will be determined, and the validity of the theoretical

model in investigating other complex well flow patterns will be evaluated.
W74-02454

UNSTEADY DRAWDOWN AT A PARTIALLY PENETRATING WELL IN A TRANSVERSELY ISOTROPIC ARTESIAN AQUIFER,
University Coll. of Engineering, Hyderabad (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04B.
W74-02466

AERIAL REMOTE SENSING OF CARBONATE TERRANES IN SHELBY COUNTY, ALABAMA,
Geological Survey, University, Ala.
For primary bibliographic entry see Field 07B.
W74-02467

GROUND-WATER RECHARGE FOR URBAN USE: LEAKY ACRES PROJECT,
Agricultural Research Service, Fresno, Calif. Ground Water Recharge Field Station.
For primary bibliographic entry see Field 04B.
W74-02468

SHALLOW GROUND WATER IN THE ZAMIN DAWAR AREA, HELMAND PROVINCE, AFGHANISTAN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04B.
W74-02472

A HYDROGEOTHERMAL DESCRIPTION OF GROUNDWATER IN UPPER CRETACEOUS DEPOSITS IN THE SOUTHEAST ARAL SEA AREA (GIDROGEOTERMICHESKAYA KHARAKTERISTIKA PODZEMNYKH VOD VERKHNEGO MELA YUGO-VOSTOCHNOGO PRIARAL'YA),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Seismologii.
S. E. Ergashev.
Uzbekskiy Geologicheskiy Zhurnal, No 1, p 76-78, 1973. 1 fig, 2 ref.

Descriptors: *Groundwater, *Geothermal studies, *Temperature, Thermocline, Thermal water, Borehole geophysics, Structural geology, Geologic time, Aquifers, Water quality.
Identifiers: *USSR, *Aral Sea area, *Cretaceous period, Tectonics.

Four hydrogeothermal regions southeast of the Aral Sea were identified on the basis of groundwater temperatures. The first region characterized by low temperatures (18-25 deg C) is confined to the Amu-Dar'ya arch and the Sultanuizdag-Bukantau horst anticlinal zone. The depth of groundwater occurrence is 3 to 15 m. The second region with moderately warm waters (25-30 deg C) is confined to the zone of the Buzgul'skiy arch. The third region with warm waters (28-35 deg C) belongs to the Tadzhikazganskiy Depression. The fourth region with high groundwater temperatures (28-56 deg C) is confined to the South Aral Sea Depression. The increase in groundwater temperature depends largely on depth of occurrence of water-bearing rocks and on structural and tectonic conditions of the area. The normal geothermal gradient for groundwater of the area is 3.0-3.5 deg C per 100 m in peripheral sections and 4.5-5.0 deg C in central parts. Thermal water of the South Aral Sea Depression can be used to heat greenhouses, schools, hospitals, and other buildings. (Josefson-USGS)
W74-02609

SOME PROBLEMS IN AGE DETERMINATION OF GROUNDWATER (NEKOTORYYE VOPROSY RASCHETA VOZRASTA PODZEMNYKH VOD),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Seismologii.
A. I. Spiridonov, A. N. Sultankhodzhayev, B. A. Beder, R. N. Taneyev, and V. G. Tyminskiy.
Uzbekskiy Geologicheskiy Zhurnal, No 3, p 38-40, 1973. 1 tab, 4 ref.

Descriptors: *Groundwater, *Age, *Radioactive dating, *Geologic time, *Gases, Argon, Helium, Aquifers, Investigations.
Identifiers: *USSR, Radon.

Results are presented of investigations of excess argon in free and dissolved gases of the Amu-Dar'ya artesian basin. Age determinations of groundwater in Lower Cretaceous and Jurassic deposits by He/Rn and He/Ar methods and by the He/Ar method corrected for Ar-40 are tabulated. (Josefson-USGS)
W74-02611

WATER RESOURCES OF THE BIG SIOUX RIVER VALLEY NEAR SIOUX FALLS, SOUTH DAKOTA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02E.
W74-02619

GROUNDWATER RESOURCES OF VAL VERDE COUNTY, TEXAS,
Geological Survey, Austin, Tex.
R. D. Reeves, and T. A. Small.
Texas Water Development Board Report 172, June 1973. 144 p, 18 fig, 7 tab, 50 ref.

Descriptors: *Groundwater resources, *Water wells, *Aquifer characteristics, *Water utilization, *Texas, Well data, Water yield, Water levels, Water quality, Chemical analysis, Hydrogeology, Groundwater movement, Surface-groundwater relationships, Streamflow, Lakes, Drillers logs, Basic data collections.
Identifiers: *Val Verde County (Tex).

The principal water-bearing unit in Val Verde County, Texas, is the Edwards and associated limestones. Nearly all of the water used in the county is obtained from groundwater sources. A total of about 1,850 acre-feet or 1.7 mgd of water was pumped from wells in 1969. About 1,200 acre-feet (1.1 mgd) was used for rural-domestic supply and livestock, about 600 acre-feet (0.5 mgd) was used for irrigation, and 50 acre-feet (0.04 mgd) was used for municipal supply. A small but undetermined amount of water was pumped for industrial use. The city of Del Rio uses water from San Felipe Springs for its municipal supply; in 1969 the city used 6,780 acre-feet (6.0 mgd). Additional large supplies of groundwater are available for development. An average of about 500,000 acre-feet per year is discharged from the Edwards and associated limestones through springs and seeps. The chemical quality of the groundwater suitable for most uses except in the extreme southeastern part of the county. (Woodard-USGS)
W74-02620

HYDROGEOLOGIC ASPECTS OF A PROPOSED SANITARY LANDFILL NEAR OLD TAMPA BAY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05E.
W74-02628

2G. Water in Soils

EXPERIMENTAL AND PREDICTED MOVEMENT OF THREE HERBICIDES IN A WATER-SATURATED SOIL,
Oklahoma State Univ., Stillwater. Dept. of Agronomy.
For primary bibliographic entry see Field 05B.
W74-02156

EFFECT OF FEEDLOT MANURE ON SOIL AND WATER QUALITY,
Department of Agriculture, Lethbridge (Alberta). Research Station.
For primary bibliographic entry see Field 05B.
W74-02157

INFLUENCE OF SOIL STRUCTURE AND MOISTURE ON NITRIFICATION,
Komenskeho Universita, Bratislava (Czechoslovakia). Dept. of Microbiology.
L. Simon.
Acta Fac Rerum Nat Univ Comenianae Microbiol. 1 p, 87-97. 1971. Illus.
Identifiers: *Nitrification, *Soil structure, *Soil moisture, Aggregates.

The intensity of nitrification of structural aggregates of the soil depends on the size of the aggregate and the degree of moisture. Mesoaggregates of small size (0.1-1.4 mm) permit maximal nitrification. Larger mesoaggregates (2-6 mm) permit a higher degree of nitrification at all degrees of moisture than microaggregates (< 0.2 mm). At a moisture content of 40% and maximal capillary capacity, nitrification depends not so much on the size of the aggregate as on the moisture content; hence, the moisture content is the most suitable for the comparison of soil nitrification in various structures. For nitrification purposes a moisture content of 80 or 100% in the soil had adverse effects.--Copyright 1973, Biological Abstracts, Inc.
W74-02192

A SELF-DRAINING SUBSURFACE RAINFALL CONSERVATION SYSTEM: ITS EFFECT ON THE SOIL WATER STATUS AND PRODUCTIVITY OF COASTAL PLAINS SANDS,
Rhodesia Univ., Sailsbury. Dept. of Agriculture.
D. A. Russell.
Soil Sci. Vol 114, No 3, p 234-238. 1972. Illus.
Identifiers: *Coastal plains, Design, Rainfall, *Sands, Soil water movement, *Subsurface drainage, Trough, Water conservation.

A water control system was established to provide simultaneously for both rainfall and nutrient conservation and drainage of excess water, with the capability of providing for crop needs over the growing season. The approach adopted was to establish a perched water table, which would be self-draining to a predetermined level when the free water level rose above that mark. To achieve the desired conditions the system consisted of a U-shaped subsurface trough operated in a manner analogous in some respects to the wick-siphon principles. The structure and use of the trough are described. Laboratory and field tests were performed. By applying the principles of soil water movement to a subsurface trough design, water and nutrient conservation, and excess water drainage can be incorporated in a single practice. This reduces drought damage hazard to crops and provides a marked increase in the productivity of sandy soils.--Copyright 1973, Biological Abstracts, Inc.
W74-02193

INFLUENCE OF THE SOIL WATER LEVEL ON MICROBIAL PROCESSES OF PASTURE AND FOREST COMMUNITIES,
Komenskeho Universita, Bratislava (Czechoslovakia). Dept. of Geobotany.
A. Frano.
Acta Fac Rerum Nat Univ Comenianae Microbiol. 1 p, 39-51. 1971. Illus.
Identifiers: Cellulose degradation, *Forests, Humus, *Microbial processes (Soil), Nitrification, *Pastures, *Soil water.

The direct influence of the water level is an inhibition of soil microbiological processes and an accumulation of organic elements. Humus formation exceeds mineralization. Where the water level effects the soil profile only by the activity of capillary water attraction to the surface, microbiological processes achieve maximal intensity and nearly equivalent mineralization. The intensity of both nitrification and cellulose degradation is much higher in forest than in pasture communities, but the biologic activity of the latter is much higher.--Copyright 1973, Biological Abstracts, Inc.
W74-02194

FACTORS AFFECTING THE MANGANESE STATUS IN SOILS OF THE U.A.R.,
Ain Shams Univ., Cairo (Egypt). Dept. of Soils.
A. H. El-Damaty, H. Hamdi, and A. A. Orabi.
U A R J Soil Sci. Vol 11, No 1, p 7-26. 1971. Illus.
Identifiers: Calcium carbonate, *Manganese, Minerals, Nutrients, *Rice, Soils, *United Arab Republic, Waterlogging, *Soil chemical properties.

The status of available Mn, in some soils of the United Arab Republic as influenced by soil reaction, organic matter and CaCO3 contents, the mechanical components and the waterlogging was studied. The different forms studied were water-soluble, exchangeable, easily-reducible and total Mn. Water-soluble Mn was absent from all samples. Alluvial soils contain fairly high amounts of the chemically available Mn, ie., the active form which is quite sufficient to support normal plant growth. These soils are rich in total Mn because of the annual sedimentation of the solid matter transported by the Nile on to the valley. Sandy and calcareous soils contain less amounts of active and total Mn than do the typical alluvial soils. The ratio of active to total Mn is less in these soils than in the alluvial ones. Highly significant positive correlation was observedbetween each of the different forms of Mn and the organic matter content, silt percentage and clay percentage. The organic matter exerted the greatest influence on active Mn as the correlation coefficient reached 0.76. A highly significant negative correlation was observed between the different forms of Mn and the soil pH value, in spite of the narrow range in which these values lie. After the selected soils were exposed to continuous waterlogging for 45 days the exchangeable Mn was almost doubled. The water-soluble form, which was absent before waterlogging, reached 4 ppm in some cases. The easily-reducible form also increased. The dry matter yield of rice plants grown on submerged soil was higher than on the unsubmerged ones. Mn concentration in rice plants as well as their total Mn content increased due to continuous waterlogging.--Copyright 1973, Biological Abstracts, Inc.
W74-02200

SOIL POLLUTION FROM CATTLE FEEDLOTS IN GEORGIA,
Georgia Univ., Athens. Dept. of Agronomy.
For primary bibliographic entry see Field 05B.
W74-02210

THE EFFECTS OF TRACE METALS ON GROUND WATER QUALITY AS INFLUENCED BY SOILS REFLECTING DIFFERENCES IN ORGANIC MATTER CONTENT AND GENETIC CONDITIONS,
Tuskegee Inst., Ala.
For primary bibliographic entry see Field 05B.
W74-02211

MIGRATION OF SUBSTANCES WITH SURFACE AND GRAVITATIONAL WATERS IN SOILS OF GEOCHEMICALLY RELATED LANDSCAPES OF BARABA, (MIGRATSIYA VESHCHESTV S PVERKHNOSTNYMI I GRAVITATSIONNYMI VODAMI V POCHVAKH GEOKHIMICHESKI SOPRYAZHENNYKH LANDSHAFTOV BARABY),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
N. I. Bazilevich, and V. M. Kurachev.
Pochvovedeniye, No 11, p 3-16, 1972. 6 tab, 8 ref.

Descriptors: *Saline soils, *Salts, Movement, *Surface waters, *Gravitational water, Groundwater, Soil types, Soil groups, Soil horizons, Soil profiles, Bogs, Inorganic compounds, Leaching, Water table, Lysimeters.
Identifiers: *USSR (Baraba Lowlands), Solonetzes, Solods, Solonchaks.

Investigations were carried out in the northern part of the Chany Depression in the Baraba Lowland to study movement of chemical substances in solonetzic, solodized, and bog soils on runoff plots and in open lysimeters. Seasonal migration of salts and desolonetzization of the B horizon were established together with solodization of the A and B1 horizons (migration of SiO2, R203, C, and suspensions), and silicification and leaching of suspensions and R203 into the B2 or B/C horizons. A part of the salts, mineral substances, and C were leached into groundwater in the solodized soils. (Josefs[illegible]USGS)
W74-02300

WATER REGIME OF SOLONCHAK SOLONETZES IN OPEN AREAS OF FORESTS IN THE NORTH CASPIAN SEA REGION, (VODNYY REZHIM SOLONCHAKOVYKH SOLONTSOV NA POLYANAKH LESNYKH NASAZHDENIY SEVERNOGO PRIKASPIYA),
I. N. Olovyannikova.
Pochvovedeniye, No 11, p 44-55, 1972. 3 fig, 5 tab, 8 ref.

Descriptors: Soil physics, *Soil moisture, *Evapotranspiration, *Soil-water-plant relationships, *Forests, Vegetation, Hydrologic cycle, Water loss, Drying, Moisture deficit, Root zone, Root distribution, Root development, Wetting, Snow, Sinks.
Identifiers: *USSR (North Caspian Sea region), *Solonetzes, *Solonchaks.

To study water regime of Solonchak Solonetzes in open areas of forests in the semidesert of the North Caspian Sea region, investigations were carried out on virgin Solonchak Solonetz and on dark-colored soil of sinks (1966-69), and on Solonetzes in openings between trees planted in 1952 (1963-68). Soil moisture content was determined to the rooting depth monthly during the growning season and to the water table in spring and autumn. Additional wetting through accumulation of snow on open areas produced a radical change in the water regime of Solonchak Solonetzes, resulting in desalinization and desolonetzization of these soils. An increase in wetting depth and soil water storage in spring contributed to growth of a luxuriant grass cover on Solonetzes in open areas. Depth of rooting of well-developed plants and depth of soil drying were greater in the open than in virgin Solonetz. Water loss from open areas during a growing season exceeded that from virgin Solonetzes by a factor of 1.5-3 and approached the amount of water lost by steppe vegetation of sinks. (Josefson-USGS)
W74-02301

MOISTURE REGIME OF SOUTHERN CHERNOZEM WITHIN SHELTERBELTS, (REZHIM VLAZHNOSTI YUZHNOGO CHERNOZEMA V SISTEME LESNYKH POLOS),
Tomsk State Univ. (USSR). Kafedra Pochvovedeniya i Agrokhimii.
V. D. Konstantinov.
Pochvovedeniye, No 11, p 56-67, 1972. 3 fig, 2 tab, 16 ref.

Descriptors: *Soil moisture, *Soil water movement, *Chernozems, *Shelterbelts, *Trees, Snowpacks, Water storage, Water balance, Water loss, Curves.
Identifiers: Chronoisopleths, *USSR (Kokchetav Oblast).

To study the effect of shelterbelts on items in the water regime of soil, investigations were carried out in 1967-69 on southern calcareous Chernozems in the Ubogan-Ishim watershed in western Kokchetav Oblast. Effectiveness of shelterbelts in North Kazakhstan should be evaluated from the standpoint of their environmental effects in winter and early summer. The effect of shelterbelts on soil moisture conditions varies areally and is most beneficial at a distance of 30-50 m from the forest edge. Soil moisture conditions in shelterbelts are optimal in April-May or April to early June, after which they deteriorate rapidly. By mid-June soil moisture in the root zone is usually exhausted. During and after this period trees draw their water from atmospheric precipitation and from deeper soil layers. Moisture exchange under trees is active to a depth of 1.5-2 m and is still significant to a depth of 2.5-3 m and even 4 m in some years. Moisture in these deeper soil layers plays an important role in the water regime of Chernozems located within shelterbelts. (Josefson-USGS)
W74-02302

DESIGN, OPERATION, AND TEMPERATURE SENSITIVITY OF A THERMOCOUPLE PSYCHROMETER MOISTURE POTENTIOMETER BASED ON THE PELTIER EFFECT, (KONSTRUKTSIYA, METODIKA PRIMENENIYA I TEMPERATURNAYA CHUVSTVITEL'NOST' TERMOPARNOGO PSIKHROMETRICHESKOGO VLAGOPOTENTSIOMETRA, OSNOVANNOGO NA EFFEKTE PEL'T'YE),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
A. M. Globus.
Pochvovedeniye, No 11, p 117-124, 1972. 4 fig, 2 tab, 6 ref.

Descriptors: *Potentiometers, *Moisture meters, Moisture content, *Temperature, *Hygrometry, Measurement, Calibrations, Humidity, Atmosphere, Temperature control, Richards apparatus, Curves.
Identifiers: *USSR, *Thermocouple psychrometers, *Peltier effect, Moisture potential.

The psychrometer method of determining the chemical potential of water in soil and plant parts is examined. Design principles for a psychrometer moisture potentionmeter based on the Peltier effect are justified, and construction of the instrument, its operation, and sensitivity characteristics are described. (Josefson-USGS)
W74-02303

INVESTIGATION OF THE RELATION BETWEEN MOISTURE POTENTIAL AND 'REDUCED FILM THICKNESS' FOR DISPERSE SYSTEMS WITH NONPOROUS PARTICLES, (ISSLEDOVANIYE ZAVISIMOSTI MEZHDU POTENTSIALOM VLAZHNOSTI I 'PRIVEDENNOY TOLSHCHINCY PLENKI' DLYA DI SPERSNYKH SISTEM S NEPORISTYMI CHASTITSAMI),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
V. M. Sirotkin, S. V. Nerpin, and M. R. Ginzburg.
Pochvovedeniye, No 11, p 125-131, 1972. 4 fig, 13 ref.

Descriptors: *Soil physics, *Moisture content, *Dispersion, *Films, *Surfaces, Particle size, Quartz, Curves, Equations.
Identifiers: USSR, Disperse systems, *Moisture potential.

The relation between moisture potential and 'reduced film thickness' can be considered unique for disperse systems with different specific surfaces provided numerical values of the specific surfaces of systems exceed 100 sq m/g. Curves of this relation for disperse systems with smaller specific surfaces can be found from data on particle-size distribution using the proposed computation method. Theoretical cuves of the relation, constructed according to the proposed method, agree well with experimental data obtained for quartz powder separates with different specific surfaces. (Josefson-USGS)
W74-02304

AN AIRBORNE GAMMA SURVEY OF MOISTURE CONTENT IN THE SURFACE DETENTION LAYER, (SAMOLETNAYA GAMMA--S'YEMKA ZAPASOV VLAGI V SLOYE POVERKHNOSTNOGO ZADERZHANIYA),
Institut Prikladnoi Geofiziki, Moscow (USSR).
A. V. Dmitriyev, R. M. Kogan, and Sh. D. Fridman.
Meteorologiya i Gidrologiya, No 4, p 64-76, April 1973. 3 tab, 19 ref.

Descriptors: *Soil moisture, *Moisture content, *Storage, *Remote sensing, *Gamma rays, Surveys, Aircraft, Radiation, Radioactivity, Radioisotopes, Snowmelt, Precipitation (Atmospheric), Equations.
Identifiers: *USSR (Shelon' River basin).

Estimates of surface detention storage in the Shelon' River basin were based on an airborne gamma survey performed on May 5-19, 1965, over test strips designed for studying accuracy of snow-water equivalent measurement using airborne gamma techniques. Measurements were made over 5 test strips which differed in land use, soil type, and character of relief. To obtain a recording of the gamma field, flights were made over all strips in the fall of 1965 (October 8-11). Water storage on the surface in May 1965 was considerably greater than in October. On four strips the moisture excess was about 10 mm and on one strip it was about 20 mm. No temporary accumulation of water on the surface was observed in May or October. The constancy of magnitude of the gamma field in May and October indicates steady-state moisture conditions in the soil and on the surface during each of these periods. (Josefson-USGS)
W74-02307

SATURATED-UNSATURATED SEEPAGE BY FINITE ELEMENTS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Soil and Water.
S. P. Neuman.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10201, p 2233-2250, December 1973. 9 fig, 19 ref, 3 append.

Descriptors: *Seepage, *Saturated flow, *Unsaturated flow, *Finite element analysis, Soil water movement, Groundwater movement, Simulation analysis, Porous media.

A Galerkin-type finite element method is given to solve the quasilinear partial differential equations of transient seepage in saturated-unsaturated porous media. The resulting computer program is capable of handling nonuniform flow regions having complex boundaries and arbitrary degrees of local anisotropy. Flow can take place in a vertical plane, in a horizontal plane, or in a three-dimensional system with radial symmetry. An arbitrary number of seepage faces can be considered simultaneously, and the positions of the exit points on these boundaries are adjusted automatically during each time step. Two examples, one of seepage through an earth dam with a sloping core and horizontal drainage blanket, and the other of seepage through a layered medium cut by a complex topography, are included. These examples indicate that the classical concept of a free surface is not always applicable when dealing with transient seepage through soils. (Knapp-USGS)
W74-02313

CONTRIBUTION OF DEVELOPED AND NATURAL MARSHLAND SOILS TO SURFACE AND SUBSURFACE WATER QUALITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05B.
W74-02327

GENERAL SOILS STUDY: PEARL RIVER, HANCOCK, HARRISON COUNTIES, MISSISSIPPI.
Soil Conservation Service, Gulfport, Miss.

Prepared for The Gulf Regional Planning Commission, Gulfport, Mississippi, 1972. 132 p, 2 fig, 23 tab.

Descriptors: *Gulf coastal plain, *Comprehensive planning, *Data collections, *Soil surveys, Soil types, Mapping, Soil physical properties, *Mississippi, Soil properties, Soil classification, Soil analysis.

The Gulf Regional Planning Commission, which serves the southeastern part of Mississippi, studied the soil types in its jurisdiction and the suitability of each soil for various uses. Twenty-three different types of soil are described, and these form 22 different soil associations. Each soil type is analyzed under the following characteristics: (1) soil properties, including water table depth, percolation rate, depth to hard rock, flood hazard, and thickness and texture of soil horizons; (2) stability of the soil for various engineering uses; (3) limitations for some urban uses; (4) suitability for cropland, pasture and woodland; (5) suitability for horticultural plants; and (6) limitations for recreational use. Maps of the distribution of each soil type are also included. (Poertner)
W74-02333

EVALUATION OF SOIL MOISTURE REGIME IN A WATERSHED,
New Brunswick Univ., Fredericton.
K. S. Davar, and D. J. Calkins.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 20 p, 3 fig, 3 tab, 2 ref.

Descriptors: *Soil moisture, *Soil moisture meters, Soil water, Moisture content, Nuclear moisture meters, Subsurface waters, Networks, Data collections, Hydrologic data, Stations, Statistics, Streamflow, *Canada, Watershed management.

The type of hydrologic response that occurs at any time in a watershed depends largely on the actual prevailing soil moisture regime. The determination of soil moisture content has been facilitated by the commercial availability of the neutron-scattering depth probe. A methodology is presented for the evaluation of watershed soil moisture regimes. Although demonstrated on a region in New Brunswick, Canada, it can be an especially important factor in areas with generally low soil moisture, where small changes in such moisture reflect a significant change in the response system. It was observed that data at each station were from different populations, and that strong correlations existed between most of the stations in representing soil moisture regime changes in relation to streamflow. (Muller-Arizona)
W74-02355

CHLORODIOXINS IN PESTICIDES, SOILS, AND PLANTS,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
For primary bibliographic entry see Field 05B.
W74-02371

PRESCRIBED FIRE EFFECTS ON WATER REPELLENCY, INFILTRATION AND RETENTION IN MIXED-CONIFER LITTER, DUFF AND SOIL,
California Univ., Berkeley. School of Forestry and Conservation.
For primary bibliographic entry see Field 4C.
W74-02442

ON SOLVING THE UNSATURATED FLOW EQUATION: THE FLUX-CONCENTRATION RELATION,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia).
J. R. Philip.
Soil Science, Vol 116, No 5, p 328-335, November 1973. 3 fig, 24 ref.

Descriptors: *Unsaturated flow, *Soil water movement, *Equations, Mathematical studies, *Soil moisture, Infiltration, Sorption.
Identifiers: Flux concentration.

The flux concentration relation expresses in reduced form the dependence of flux density on moisture content during various unsteady flow phenomena in unsaturated soils. The general properties of the flux concentration were established for various phenomena: one-dimensional sorption and infiltration with constant concentration conditions and one-dimensional sorption (for the linear soil only) with constant and variable flux and variable concentration conditions. The flux concentration is independent of time for some phenomena and it varies only mildly with time for some others; and, for some phenomena, the dependence of flux concentration on the shape of the moisture diffusivity function lies within fairly narrow bounds, which are fixed by reference to the extreme cases of the delta-function and the linear soil. This relative stability makes it a useful aid to the study of methods of solving the unsaturated flow equation. An appendix demonstrates that the approximation of step function moisture profiles implies a delta function moisture diffusivity function. (Knapp-USGS)
W74-02464

ON THE CONCEPT AND DETERMINATION OF CRITICAL SOIL MOISTURE,
M. Gracanin.
Acta Bot Croat. 31. p 181-188, 1972.
Identifiers: *Soil moisture, *Reviews, *Wilting point, Inert water.

A review of literature on the determination of permanent wilting coefficient or wilting point is given. Inert water (Iv) values determined in the laboratory were highly dependent on the amount of rooting throughout the soil. Lower Iv values were generally obtained from soils with more roots. This limitation occurs especially in heavy colloid-rich soil with slow movement of capillary water. In determination of critical water content in the field these factors are more strongly expressed. The following are differentiated: 'the soil capacity for inert water' or the real critical moisture determined by the moisture at which the absorptive powers of soil and the plant are in equilibrium; 'critical field moisture' (Vkp)/or the moisture of the rhizosphere at which plants cannot supply themselves in time with ecologically active water due to slow movement of capillary water; and 'apparent critical field moisture' (Avkp) determined by the disproportion of transportation rate in the conducting vessels of the plant and of transpiration intensity. Although Iv is relatively constant,

Vkp is dependent on soil texture and structure, root net architecture, and longitudinal growth of the root, plant species and developmental phase. Avkp is relatively independent of soil moisture, but depends on the capacity of the plant to regulate water transportation and transpiration rates.--Copyright 1973, Biological Abstracts, Inc.
W74-02546

INFLUENCE OF HERBICIDES ON MICROBIOLOGICAL CONDITIONS,
Komenskeho Universita, Bratislava (Czechoslovakia). Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-02548

A STUDY OF ITEMS IN THE GROUNDWATER BALANCE OF WATERLOGGED AREAS (OB UZUCHENII ELEMENTOV BALANSA GRUNTOVYKH VOD NO ZABOLOCHENNYKH UCHASTKAKH),
For primary bibliographic entry see Field 02D.
W74-02610

WATER RESOURCES OF THE SKOKOMISH INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
D. Molenaar, and J. E. Cummans.
Open-file report, 1973. 58 p, 6 fig, 15 tab, 10 ref, append.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Indian reservations, *Washington, Hydrologic data, Streamflow, Flow rates, Water wells, Aquifer characteristics, Water yield, Water quality, Tidal effects, Saline water intrusion, Estuaries, Well data, Drillers logs, Water level fluctuations, Water temperature, Flood plains, Water analysis, Chemical analysis, Data collections, Floods.
Identifiers: *Skokomish Indian Reservation (Wash).

The 7.5-square-mile Skokomish Indian Reservation in central Mason County, Washington, has an abundant supply of good quality surface water from the Skokomish River for use in a potential fish hatchery or other aquaculture facility. The average flow of the river at the reservation for the period 1944-71 was about 540,000 gpm; the greatest flow was about 12.1 million gpm and the smallest flow was about 56,100 gpm. Saline water from Hood Canal moves upstream less than a mile in the tidal reach of the Skokomish River. The flood of January 20-21, 1972, with a flow of about 8.3 million gpm, covered a large part of the flood plain, where many homes are situated; a flood of this size occurs, on the average, every 4 years. Several small streams flow eastward across the reservation into Hood Canal. Some of these streams dry up in the summer but others flow the year round. Water from wells is obtained mostly at depths less than 70 feet. Wells generally are used for domestic supplies, and pump yields are 5-10 gpm. Seasonal fluctuations of water levels in wells range from less than a foot to about 4 feet. The water is of good chemical quality. (Woodard-USGS)
W74-02623

2H. Lakes

SOME LIMNOLOGICAL REMARKS ON LAKE SAIZUCHI-NUMA, YAMAGATA PREFECTURE, (IN JAPANESE),
Yamagata Univ. (Japan). Lab. of Science Education.
For primary bibliographic entry see Field 05C.
W74-02207

COMPUTER SIMULATION OF TROPHIC LEVEL INTERRELATIONSHIPS IN CAYUGA LAKE,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 05C.
W74-02216

EXPERIMENTAL STUDIES ON PHYTOPLANKTON SUCCESSION IN CAYUGA LAKE,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 05C.
W74-02217

USING THE ADSORPTION METHOD ON ACTIVATED CHARCOAL WITH CHLOROFORM EXTRACTION (CCE) FOR EVALUATING WATER POLLUTION BY ORGANIC SUBSTANCES, (IN RUSSIAN),
Permskii Politekhnicheskii Institut (USSR). Dept. of Sanitary Technology.
For primary bibliographic entry see Field 05B.
W74-02232

ON THE VARIATION OF SALINITY DISTRIBUTION IN A RESERVOIR, SITUATED IN RECLAIMED LAND, (JAPANESE),
Saga Univ. (Japan). Lab. of Shore Reclamation.
K. Watanabe, and K. Hasegawa.
Agric Bull Saga Univ. 32. p 97-106. 1972. Illus. (English summary).
Identifiers: Irrigation water, *Reclaimed land, Reservoirs, *Salinity distribution, Wind.

In a reservoir, situated in reclaimed land, it takes about a year after construction for salinity to decrease within the limit of allowable irrigation water, and then salinity occurs periodically. A long-term observation was carried out in order to determine the mechanism of variation of salinity in a reservoir. The freshening process is divided into a period of replacement of sea water by fresh water and a period of variation of salinity. A large-scale reservoir has a strong tendency for 2-layer stratified flow with dense salt water at the bottom. A small-scale reservoir has good vertical diffusion because of the small difference of density between the 2 layers. In the period of the variation of salinity the salt inflow by ground water must be considered. Wind strongly affects the vertical distribution of salinity, and the critical velocity of wind is related to the depth of fresh water in a reservoir. A reservoir should be located in the lowest reaches of reclaimed land, some distance away from a sea dike in order to check the intrusion of sea water.--Copyright 1973, Biological Abstracts, Inc.
W74-02246

THE ABILITY OF BACTERIA TO MINERALIZE ALGAE ORGANIC MATTER, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 05B.
W74-02252

MICROFLORA AND CHEMICAL COMPOSITION OF THE BOTTOM DEPOSITS OF THE KAIRAK-KUM RESERVOIR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSSR, Dushanbe. Institut Zoologii i Parazitologii.
For primary bibliographic entry see Field 05B.
W74-02253

LAKE SARY-CHELEK AND ITS ZOOPLANKTON, (IN RUSSIAN),
Tashkent Univ. (USSR).
M. F. Bundtsettel'.
Uzb Biol Zh. Vol 16, No 1, p 51-53. 1972.
Identifiers: *Asplanchna-Priodonta, Lakes, Plankton, *USSR (Taskent), *Zooplankton.

Following a description of certain physical characteristics of this USSR lake the zooplankton population is described, which is predominantly composed of Asplanchna priodonta. The highest number was observed during summer. The effect of various temperatures at various depths of the lake, and its effect on the zooplankton are presented.--Copyright 1973, Biological Abstracts, Inc.
W74-02261

ADJUSTMENT OF FRICTION IN HYDRAULIC MODELS OF LAKES,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
J-C. Shiau, and R. R. Rumer, Jr.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10222, p 2251-2262, December 1973. 2 fig, 1 tab, 12 ref, 3 append. FWPCA (EPA) Grant WP-00837.

Descriptors: *Seiches, *Hydraulic models, *Hydraulic similitude, *Waves (Water), Fluid friction, Froude number.
Identifiers: Proudman number.

For complete dynamic similarity between a hydraulic model of a lake or closed basin and its prototype, both the Froude number and the Proudman number must be equal in the model and the prototype. For turbulent flow the Proudman number cannot be explicitly determined and adjustment of model friction may be required. A method for adjustment of model friction is described which requires comparison of the damping of a standing long wave (or seiche) in the prototype and in the model basin. Assuming that the model frictional resistance could be decomposed into smooth boundary resistance and the resistance due to the addition of roughness elements, a mathematical formulation was developed for use in predicting the decay modulus for a roughened model basin. Good agreement was found between the analytical predictions and experimental results. (Knapp-USGS)
W74-02314

CONTRIBUTION TO THE STUDY OF ZOOPLANKTON AND ZOOBENTHOS IN THE MINGECHAUR RESERVOIR, (IN RUSSIAN),
A. R. Khalilov, and I. A. Akhmedov.
Izv Akad Nauk Az SSR Ser Biol Nauk. 2. p 91-96. 1972.
Identifiers: Arctodiaptomus-Acutilobatus, *Cryptochironomus, Daphnia-Longispina, Diaphanosoma-Brachyurum, Mesocyclops-Dybowskii, Plankton, Polyarthra-Trigla, *Procladius, Reservoirs, Synchaeta-Pectinata, *USSR (Azerbaydzhan), *Zooplankton, Zoobenthos.

The zooplankton and zoobenthos fauna of the Mingechaur (Azerbaydzhan, USSR) storage-lake was studied. The zooplankton fauna contained 25 species of which Polyarthra trigla, Synchaeta pectinata, Diaphanosoma brachyurum, Daphnia longispina, Arctodiaptomus acutilobatus and Mesocyclops dybowskii were prevalent. The zoobenthos fauna contained 77 species and forms with Procladius and Cryptochironomus ex. gr. defectus being most frequent.--Copyright 1973, Biological Abstracts, Inc.
W74-02341

USE OF SEPHADEX GEL FOR THE FRACTIONATION OF ORGANIC MATTER IN LAKE WATER, (IN RUSSIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
For primary bibliographic entry see Field 05A.
W74-02343

COMPARATIVE BIOLOGY OF TILAPIA RENDALLI (BOULENGER) (PISCES CICHLIDAE) IN LAKE ITASY AND LAKE MANTASOA, (IN FRENCH),
J. Moreau.
Cah O R S T O M (Off Rech Sci Tech Outre-Mer) Ser Hydrobiol. Vol 5, No 1, p 3-52. Illus. 1971. (English summary).
Identifiers: Breeding, *Cichlidae, Comparative biology, Fecundity, Feeding, Growth, Lakes, *Madagascar (Lake Itasy-Lake Mantosa), Malagasy, Pisces, Population, Tilapia-Nilotica, *Tilapia-Rendalli.

A comparative study was made of the biology of T. rendalli in 2 lakes of the Malagasy Highlands (Madagascar): Itasy and Mantasoa lakes. These lakes were compared with respect to the geography, climate, aquatic conditions and T. rendalli populations. T. rendalli has a larger breeding season and better fecundity in Itasy lake. In Mantasoa lake the fecundity depends on the breeding season, Egg laying occurs more often in the former than in the latter lake. This fish is herbivorous and phytoplanktophagous in Itasy lake and only planktophagous in Mantasoa lake. Statistical tests on its condition-coefficient are included. The growth of T. rendalli was analyzed by reading and interpreting ring formation on the scales. Growth curves are drawn according to the equation of Von Bertalanffy by Abramson and Tomlinson method. T. renalli population dynamics and the suitability of introduction of a new species of Tilapia (T. nilotica) is discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-02344

LIMNOLOGICAL CHARACTERISTICS OF JEZERO ON THE ISLAND OF KRK, (IN SERBO-CROATIAN),
M. Petrik, M. Zebec, and M. Mestrov.
Krs Jugosl Carsus Iugosl. Vol 7, No 6, p 189-206. 1971. Illus. (English summary).
Identifiers: Islands, Krk Island, Limnological studies, *Yugoslavia (Jezero Lake).

Physico-chemical and biological analyses of the water of Jezero, a lake on the island of Krk, Yugoslavia carried out in June and July 1968, have shown that horizontally the water is thermally and chemically homogeneous and that thermal and chemical stratification takes place in the first half of summer. According to biological evaluation and vertical distribution of O2, showing a considerable domination of the deficient over the sufficient layer, Jezero is a typical eutrophic lake; it is in an advanced stage of its development as is shown by the distribution of macrovegetation in the lake. Low concentrations of BOD5, nitrogen compounds, and phosphates indicate that there is no pollution of water. Saprobiologically, the water has proved to be in a beta-mesosaprobic condition. The hardness of the water, 230-279 mg CaCO3/l, is for the most part carbonate hardness, largely consisting of Ca hardness, which is characteristic of water from calcareous soil. Chlorides were not high, about 90 mg/l; this concentration is far below the concentration found in the well water Vrutak which provides water for the water-supply system of the near-by village of Njivice. Measures are proposed to stop the process of eutrophication and pollution from the surrounding parts of the lake and from the Veli Lug area.--Copyright 1973, Biological Abstracts, Inc.
W74-02386

GROWTH RATES OF LEPOMIS MACROCHIRUS (CENTRARCHIDAE) IN THREE AREAS OF LAKE TEXOMA,
Ouachita Baptist Univ., Arkadelphia, Ark.
H. Brown, and H. McCarley.
Southwest Nat. Vol 17, No 4, P 371-374. 1973. Illus.
Identifiers: Centrarchidae, *Growth rates, Lakes, Lepomis-Macrochirus, *Lake Texoma (Tex-Okla), *Bluegulls.

Growth rates of bluegills (L. macrochirus) were determined for 3 areas of Lake Texoma Oklahoma: the Buncombe Creek area, the Island area, and the Denison Dam area. The total length of the Island bluegills for all age classes exceeded bluegills from both the Buncombe Creek and Denison Dam areas. The difference in total length of bluegills of the IV and V age classes from the Islands was significantly greater than the bluegills from the other 2 areas. Calculated growth rates of age groups IV and V also confirmed that bluegills in the Island area grew more during each year of life than bluegills in the other 2 areas.--Copyright 1973, Biological Abstracts, Inc.
W74-02422

MERCURY IN FISH, SEDIMENTS, AND WATER IN LAKE OAHE, SOUTH DAKOTA,
Environmental Protection Agency, Kansas City, Mo. Region VII.
For primary bibliographic entry see Field 05A.
W74-02423

TOXAPHENE ACCUMULATION IN FISH IN LAKES TREATED FOR ROUGH FISH CONTROL,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 05C.
W74-02425

THE INFLUENCE OF ORGANIC DECOMPOSITION ON CARBON DIOXIDE HYDROGEN SULFIDE, DISSOLVED OXYGEN, AND ALGAE GROWTH IN THE DWORSHAK RESERVOIR,
Idaho Univ., Moscow. Dept. of Bacteriology and Biochemistry.
For primary bibliographic entry see Field 05C.
W74-02444

DETERMINATION OF THE MICROLEVEL TEMPERATURES DURING LAKE COOLING, ICE FORMATION, ICEMELT AND THE BREAK-UP OF THE ICE COVER OF A MOUNTAIN LAKE, HOLLAND LAKE, MISSOULA COUNTY,
Missoula. Dept. of Zoology.
For primary bibliographic entry see Field 02C.
W74-02447

DESCRIPTION, DISTRIBUTION, AND ECOLOGY OF THE ROTIFER AND CRUSTACEAN PLANKTON COMMUNITIES, FLATHEAD LAKE, MONTANA,
Montana Univ., Missoula. Dept. of Zoology.
J. F. Tibbs.
Available from the National Technical Information Service as PB-226 242 $2.75 in paper copy, $1.45 in microfiche. Montana University Joint Water Resources Research Center, Report No. 39 Bozeman, (1973) 9p, 1fig, 1tab, 13 ref. OWRR A-052-MONT (1).

Descriptors: Ecology, Zoology, *Crustaceans, *Rotifers, *Plankton, Montana, Distribution.
Identifiers: *Flathead Lake (Mont).

Objectives were to determine the rotifer, copepod, and cladoceran fauna of Flathead Lake and to describe the Diel and temporal variations of density and spatial distribution as influenced by physical and chemical features of the lake. Another objective was the recovery of records, notes, and collections of previous investigators, such that irregularities in the published literature might be corrected or confirmed. Because few collections of any sort remain in Biological Station or University of Montana Museums, to locate museums, universities, and individuals who may have or may know the location of Flathead Lake zooplankton collections. (Holje-Montana)
W74-02448

QUANTITATIVE ESTIMATION OF BOTTOM FAUNA IN LAKE MARIUT,
Alexandria Inst. of Oceanography and Fisheries (Egypt).
A. A. Samaan, and A. A. Aleem.
Bull Inst Oceanogr Fish. 2. p 375-397, 1972, Illus.
Identifiers: Balanus-improvisus, *Bottom fauna, Chironomid, Corophium, Cyprideis-litoralis, Foraminifera, Gammarus, Lakes, Larvae, Melania-tuberculata, Mercierella-enigmatica, Nematode, Nereis-diversicolor, Oligochaete, *United Arab Republic (Lake Mariut), *Distribution patterns.

The distribution of bottom animals in Lake Mariut, United Arab Republic varies greatly according to the different habitats. The highly polluted area is extremely poor in bottom animals, while the less polluted area harbors a fauna similar to that present in the bare area but in smaller numbers. The bare area is the most suitable habitat for the survival of benthos. The Potamogeton belt was unfavorable for the growth of bottom animals. The polychaete Nereis diversicolor is the most important bottom animal inhabiting the lake and it constitutes about 49.9% of the biomass of bottom animals. It shows a peak in Jan. and in April. The gastropod Melania tuberculata constitutes about 34.3% of the biomass of the bottom fauna. It is widely distributed in the bare area. Melania is recorded all year with maximum distribution in Aug. and Sept. The amphipod Corophium constitutes about 11.2% of the biomass of bottom animals. It is recorded only in the bare area. Gammarus comprises about 3.4% of the biomass of the bottom animals in the lake. Chironomid larvae constitute about 1.2% of the biomass of bottom animals in the lake. They form the mean benthos at the Potamogeton plant belt. Two other forms of bottom animals of rare occurrence comprise the barnacle Balanus improvisus and the tube worm Mercierella enigmatica. These animals show uneven distribution and they usually grow on hard bottoms and on stems of phragmites. Microscopic examination of the bottom muds indicates the presence of several microorganisms in the lake bottom. These include: the ostracod Cyprideis litoralis, free living nematodes, oligochaetes and foramini era.--Copyright 1973, Biological Abstracts, Inc.
W74-02549

ON MALLOMONAS LELYMEME HARRIS ET BRADLEY (CHRYSOPHYCEAE), (IN JAPANESE),
Kobe Univ. (Japan). Dept. of Biology.
E. Takahashi, and H. Hirose.
Bull Jap Soc Phycol. 20 (3): 90-93, 1972, Illus, English summary.
Identifiers: *Chrysophyceae, *Japan, Mallomonas-lelymeme, Morphology, Ponds, Temperature, Hydrogen ion concentration, Algae.

M. lelymeme was found from ponds in Japan. The characteristic structure revealed by electron microscopy closely agrees with that of the type species, but differs slightly from other foreign material hitherto reported, in that the lattice structure at the shield was smaller in number of the crossing ridges. In Japan and foreign countries, the species was found from lakes and ponds whose pH was in a range from 4.9-6.6 and the water temperature was in a wide range less than 29C. This proves that the species is acidophylic and eurythermal.--Copyright 1973, Biological Abstracts, Inc.
W74-02550

COMPARATIVE PRODUCTIVITY STUDIES OF THREE MECKLENBURG LAKES (LAKE KUMMEROW, LAKE TETEROW AND LAKE MALCHIN), (IN GERMAN),
Rostock Univ. (East Germany). Institut fuer Hygiene.
L. Kalbe, and H. A. Schulze.
Z Gesamte Hyg Grenzgeb. Vol 18, No 3, p 197-201. 1972. Illus.

Identifiers: *East Germany (Mecklenburg), Lakes, *Sampling, *Photosynthetic productivity, Plankton.

These 3 lakes, Kummerower (KS), Teterower (TS), and Malchiner (MS) See (East Germany) were studied by spot sampling and by the 14C-method in situ for photosynthetic productivity. Various characteristics of these lakes, such as geology, size, depth, etc. are pointed out. The tests were done by a crossover technique, involving exposure of sample bottles from one lake to one of the other lakes. Plankton containing MS and TS water are superior to KS water in regard to photosynthetic potency and nutrient reserves, but cannot fully utilize these potencies in the original waters for reasons of the optical energy climate.--Copyright 1973, Biological Abstracts, Inc.
W74-02558

PHYTOINDICATION OF SALINE GROUND IN DRYING UP SHALLOW LAKES, (IN RUSSIAN),
M. T. Ilyushina.
Ekologiya. Vol 3, No 5, p 68-73. 1972.
Identifiers: Lakes, *Phytoindicators, Phytocenoses, Shallow lakes, *USSR (West Siberia), *Salinity.

Indicators of the degree of salinity increase in grounds of drying-up lakes of West Karakhsta and southern West Siberia, USSR, from an ecological series of phytocenoses of the near lake area (prior to drying-up) and of phytocenoses of the lake bottom (after drying-up) are presented.--Copyright 1973, Biological Abstracts, Inc.
W74-02559

SEASONAL VARIATIONS IN THE QUALITATIVE AND QUANTITATIVE COMPOSITION OF YOUNG FISH POPULATIONS IN THE VARVARA RESERVOIR, (IN RUSSIAN),
G. S. Abbasov, and Kh. M. Ali-zade.
Izv Akad Nauk Az SSR Ser Biol Nauk. 1, p 91-96. 1972. Illus.
Identifiers: Barbel, Bream, Bullhead, *Fish populations, Gambusia, Gudgeon, Perch, Pike, Reservoirs, Roach, Seasonal, Tench, *USSR (Varuara reservoir).

The ichthyofauna of the Varvara storage lake, USSR, was studied with special regard to young fishes. The young fish population was most numerous spring and summer, and most scarce during fall and especially in winter. Roach, bream and Gambusia were the most populous of a total of 26 species, while small populations of tench, barbel, pike perch, gudgeon and bullhead were found.--Copyright 1973, Biological Abstracts, Inc.
W74-02560

ENVIRONMENTAL STUDY OF ERTS-1 IMAGERY: LAKE CHAMPLAIN AND VERMONT,
Vermont Univ., Burlington.
For primary bibliographic entry see Field 07B.
W74-02581

STUDIES IN THE LAKE ONTARIO BASIN USING ERTS-1 AND HIGH ALTITUDE DATA,
Guelph Univ. (Ontario).
For primary bibliographic entry see Field 07B.
W74-02599

PROGRESS OF AN ERTS-1 PROGRAM FOR LAKE ONTARIO AND ITS BASIN,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07B.
W74-02600

REMOTE SENSING OF TURBIDITY PLUMES IN LAKE ONTARIO,
Geological Survey, Arlington, Va.
For primary bibliographic entry see Field 07B.
W74-02601

ERTS-1 VIEWS THE GREAT LAKES,
Wisconsin Univ., Milwaukee. Air Pollution Analysis Lab.
For primary bibliographic entry see Field 07B.
W74-02602

THE AGE GROUP DISTRIBUTION OF PELOBATES FUSCUS (LAUR.) AT THE KUIBYSHEV RESERVOIR SHORES (IN RUSSIAN),
Kazan State Univ. (USSR).
V. A. Ushakov, and V. I. Garanin.
Ekologiya, Vol 3, No 4, p 89-90, 1972.
Identifiers: Age distribution, *Pelobates-fuscus, Reservoir shores, *USSR (Kuibyshev reservoir), *Animal populations.

The influence of huge water reserves (USSR) upon the structure of animal populations surrounding it was examined. A P. fuscus population was studied from 1964-1969. Different age groups settle at various sites. Adults and young disperse during the summer throughout forests along the accumulative beaches, while the forests lining abrasive beaches are almost exclusively occupied by young animals that do not participate in that seasons mating period. Through such emmigration of young, the area covered by P. fuscus increases while the competition in the optimal area diminishes.--Copyright 1973, Biological Abstracts, Inc.
W74-02641

STUDIES OF THE SINKING PLUME PHENOMENON,
Argonne National Lab., Ill. Center for Environmental Studies.
For primary bibliographic entry see Field 05C.
W74-02644

SEDIMENTATION AND SCOUR OFF NUCLEAR POWER PLANTS,
Wisconsin Univ., Madison. Marine Research Lab.
For primary bibliographic entry see Field 02J.
W74-02645

AGE STRUCTURE OF POPULATIONS OF SOME AMPHIBIA ON BANKS OF WATER RESERVOIRS (IN CZECH),
V. A. Usakov.
Biologia (Bratisl), Vol 27, No 11, p 891-895, 1972, Illus, English summary.
Identifiers: Age structure, *Amphibia, *Bombina-bombina, *Pelobates-fuscus, Reservoirs, Animal populations.

As the result of an analysis of the age structure of populations of Pelobates fescus Laur. and Bombina bombina L. it is concluded that a large water reservoir influences local peculiarities of territorial distribution of particular age groups of Amphibia. The different relationships of the particular groups within the abrasional and accumulative river side populations are predetermined.--Copyright 1973, Biological Abstracts, Inc.
W74-02650

2I. Water in Plants

STUDY OF THE INTRACELLULAR WATER STATE IN PLANTS UNDER THE EFFECT OF PHENOLS, (IN RUSSIAN),
Voronezhskii Lesotekhnicheskii Institut (USSR).
V. D. Roshchina.
S-KH Biol. Vol 7, No 4, p 554-558. 1972. Illus. (English summary).
Identifiers: *Beta-Vulgaris-F-Rubra, *Intracellular water, *Phenols, *Plant tissues, Water exchange (Plants).

The storing tissue of Beta vulgaris f. rubra was treated with solutions of phenol, resorcine, floroglucine, pyrogallol, salicylic and cinnamic acids at concentrations of 10-3 to 10-4 M. Changes of the water content were determined by the method of dynamic characteristics. Phenol compounds affect the water-exchange of plant tissues and the state of the intracellular water, probably due to the interaction of phenols with cytoplasmic proteins. The greatest transformations of the water composition are observed as an effect of aromatic oxyacids and polyphenols with the orthoplacement of hydroxylic groups.--Copyright 1973, Biological Abstracts, Inc.
W74-02234

CILIATED PROTOZOA. AN ILLUSTRATED GUIDE TO THE SPECIES USED AS BIOLOGICAL INDICATORS IN FRESHWATER BIOLOGY,
H. Bick.
World Health Organization: Geneva, Switzerland. 1972. 198 p. Illus. Pr. $6.00.
Identifiers: Biology, Books, *Ciliated protozoa, *Guides (Illustrated), *Indicators (Biological), Protozoa, Species.

This illustrated guide contains a taxonomic key to the most important families and genera of non-parasitic freshwater ciliates, detailed descriptions of the morphology and ecological requirements of 84 spp., and diagnostic line illustrations of 135 spp. A short introduction outlines some of the methods used in taxonomy, mentioning key points that should be noted when a species is being determined. The guide also includes a selected bibliography, a glossary to technical terms and an index of genera and species described or illustrated.--Copyright 1973, Biological Abstracts, Inc.
W74-02236

THE PHENOLOGY OF DRAGONFLIES IN THE DEHRA DUN VALLEY, INDIA,
Forest Research Inst., Dehra Dun (India). Forest Entomology Branch.
A. Kumar.
Odonatologica (Utr). Vol 1, No 4, p 199-207. 1972. Illus.
Identifiers: *Dragonflies, *India (Dehra Dun Valley), Larval habitats, *Phenology, Monsoon ponds.

Seasonal distribution of some Indian species, which centers largely around different types of larval habitats, is discussed. In the valley, 2 main types of larval habitats are present, i.e., the perennial streams, and seasonal monsoon ponds. The observations seem to indicate that in the species developing in perennial streams, the larval period is prolonged for some 5-8 mo., while the adults are on wings for not less than 3-4 mo. On the other hand, the larval period of species breeding in seasonal monsoon ponds is shortened to about 2-4 mo., while their adult life span is prolonged to 8-9 mo.--Copyright 1973, Biological Abstracts, Inc.
W74-02237

ON THE ORIGIN OF THE WET-SEASON FORM OF ZONOCERUS VARIEGATUS (L.) (ORTH., ACRIDIDAE) IN SOUTHERN NIGERIA, WITH SOME BIOLOGICAL NOTES,
Iban Univ. (Nigeria). Dept. of Biology.
T. Taylor.
Bull Entomol Res. Vol 61, No 4, p 661-667. 1972. Illus.
Identifiers: Ctenophores, *Acrididae, Biological studies, Breeding, Forests, Habitats, Morphometrics, *Nigeria, Orthoptera, Rain, Savanna, Seasons, *Zonocerus-Variegatus.

Previous reports and field observations at Ibadan and in northern Nigeria established the occurrence of a dry-season form and wet-season form of Z. variegatus. The wet-season form in the savanna areas of northern Nigeria is virtually identical with

that from southern Nigeria on the basis of breeding seasons, habitat and morphometrics. Morphometrics show the wet- and dry-season forms to be distinct. The dry-season form in the wet rain forest zone may spread into the dry savanna areas giving rise to a wet-season form adapted to the different climatic conditions. The increasing occurrence of the wet-season form in the south probably represents a re-invasion by the northern wet-season form.--Copyright 1973, Biological Abstracts, Inc.
W74-02238

PLANT ASSOCIATIONS OF THE SOUTHERN VERCORS MASSIVE: ASSOCIATIONS OF SPRINGS AND MARSHLANDS AT SUBALPINE ELEVATION,
J. Ritter.
Vegetatio. Vol 25, No 5/6, p 357-365. 1972. Illus.
Identifiers: Elevation, *France (Vercors massive), Habitat, *Marshlands, *Nutrition, *Plant communities, Springs, Subalpine.

The sociological organization and floristic composition of the spring associations Montio-Cardaminetea Montio-Cardaminetalia and Cratoneurion commutati, and of the marshland associations Scheuchzerio-Caricetea fuscae, Caricetalia Davallianae, Eriophorion latifoliae at Vercors massive (France) are described. While the rocky terrain and the alkaline nature of the marshes is determinant for these associations, the presence of streams provides for their nutrition and is thus likewise indispensable.--Copyright 1973, Biological Abstracts, Inc.
W74-02243

THE ACTION OF ABSCISIC ACID ON ION UPTAKE AND WATER FLOW IN PLANT ROOTS,
Sydney Univ. (Australia). School of Biological Sciences.
For primary bibliographic entry see Field 03F.
W74-02260

DESIGN, OPERATION, AND TEMPERATURE SENSITIVITY OF A THERMOCOUPLE PSYCHROMETER MOISTURE POTENTIOMETER BASED ON THE PELTIER EFFECT, (KONSTRUKTSIYA, METODIKA PRIMENENIYA I TEMPERATURNAYA CHUVSTVITEL'NOST' TERMOPARNOGO PSIKHROMETRICHESKOGO VLAGOPOTENTSIOMETRA, OSNOVANNOGO NA EFFEKTE PEL'T'YE),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 02G.
W74-02303

ECOLOGICAL AND PHYTOSOCIOLOGICAL STUDY OF A SECTOR IN THE LYBIAN DESERT,
Cairo Univ., Giza (Egypt). Faculty of Science.
K. H. Batanouny, and S. Abu El-Souod.
Vegetatio. Vol 25, No 5/6, p 335-356. 1972. Illus.
Identifiers: Anabasis-Articulata , Aristida-Plumosa, Artemisia-Monosperma, *Deserts, *Ecological studies, Helianthemum-Lippii, *Libian desert, *Phytosociological studies, Pituranthus-Tortousus, Soil moisture.

The area surveyed is located in the north-eastern corner of the Lybian desert and extending along Cairo-Alexandria desert road. The southern part of the area is extremely arid, while the northern part is semi-arid and with graduation in between. The annual rainfall ranges between 24 mm at Giza located in the extreme south and 184 mm at Alexandria located in the north. The vegetation is formed of plant communities with different floristic composition. The plant cover ranges from widely separated patches of vegetation in spots where the coverage is less than 5% to scrubland types where the coverage may reach up to 70%. This difference is comparable to the variation in the annual rainfall from south to north. Five communities were defined along the road, named after the dominant species: Aristida plumosa, Pituranthos tortuosus, Artemisia monosperma, Helianthemum lippii and Anabasis articulata. Each community has a group of perennial species showing abundance-dominance scales and presence values higher than in other communities. Perennials are better indicators for plant life in any area than ephemerals. Plant communities in the desert are better defined not only by the dominant, but also by the group of ecologically related species, termed 'important species' of the community. Water relations of soil and air are the major controlling factors. The growth of plants is a matter of tolerance and not of fulfillment of requirements. The various species show different ecological amplitudes, connected with the tolerance of the plant to the drastic conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-02507

STUDY ON THE PLASMOLYSIS TIME IN EPIDERMAL CELLS FROM LEAVES OF SAXIFRAGA STOLONIFERA MEERB (IN JAPANESE),
Kumamoto Univ. (Japan). Faculty of Education.
Masa-O. Ya-E.
Mem Fac Educ Kumamoto Univ Sect 1 (Nat Sci). 20. p 33-42, 1972, Illus, English summary.
Identifiers: Diurnal, *Epidermal cells, Leaves, Permeability, *Plasmolysis time, *Saxifraga-stolonifera, Seasonal, Temperature, Time.

The plasmolysis time in epidermal cells from the underside of S. stolonifera was studied especially in relation to temperature. The plasmolyticum was employed 1.5 isotonic and 0.73 M sucrose solution. Plasmolysis time is longest in Jan. and Feb., the coldest season, and is shortest in July and Aug., the hottest season. In spring and autumn, plasmolysis time is intermediate between those in winter and in summer, yet that in spring is longer than that in autumn even at the same temperature. Plasmolysis time in the early morning is longer than that in the daytime, and the more temperature changes in a day, the more plasmolysis time changes. Temperature coefficient of plasmolysis time, speed of rounding up on plasmolysis, was about Q10 ± 4 at 10C-20C-30C, when the temperature during each experiment was changed artificially in Jan. and Feb. In a certain year, the Q10 at 10C-20C in hardened cells was larger than Q10 ± 4. The seasonal and diurnal variations of plasmolysis time are affected passively by temperature.--Copyright 1973, Biological Abstracts, Inc.
W74-02542

SOME FURTHER RESULTS OF THE ZOOPLANKTON STUDIES IN THE CZECHSLOVAK-HUNGARIAN STRETCH OF THE DANUBE,
Slovenske Polnohospodarske Akademie, Bratislava (Czechoslovakia). Laboratorium Rybarstva.
M. Vranovsky.
Biologia (Bratisl), Vol 27, No 11, p 821-827, 1972, Illus, English summary.
Identifiers: *Cladocera, *Copepoda, Czechoslovakia, *Danube River, Hungary, Plankton, *Rotifera, *Zooplankton.

The average abundance of Rotatoria prevailed over that of Copepoda 25 times and over that of Cladocera 170 times in the Danube zooplankton in 1967. The decrease of the current velocity or short-term interruptions of the flow in the backwaters studied showed either none at all or only a small influence on the zooplankton. However, during the autumn interruption of the flow lasting 3 mo. in the backwaters, average abundance of zooplankton increased conspicuously in comparison with that in the main stream.--Copyright 1973, Biological Abstracts, Inc.
W74-02545

A NEW AQUATIC INSECT TRAP,
Union Carbide Corp., Tarrytown, N.Y.
For primary bibliographic entry see Field 07B.
W74-02551

CONSIDERATIONS CONCERNING THE BIOLOGY AND DISTRIBUTION AREA OF THE CYPRINID FISH PSEUDORASBORA PARVA (SCHLEGEL) IN THE ROMANIAN WATERS,
R. Giurca, and N. Angelescu.
Bul Cercet Piscic. Vol 30, No 3/4, p 99-109. 1971. Illus. (English summary).
Identifiers: Biology, *Cyprinid fish, Distribution, Pseudorasbora-Parva, *Romania.

The presence of the genus Pseudorasbora (introduced accidentally from China, with the fry of some game fish species) in natural water bodies (Ilfov, Crisul Repede, Danube Delta, Urlui) and in fish culture stations (Nucet, Pirlita, I. C. Frimu, Cefa, Buftea, Frasinet, Vitanesti, Mostistea) is noted, P. parva (whose vernacular name 'briceag,' was proposed in 1970) is one of the freshwater fishes with a reduced body size (6.5-10.5 cm-without C) and low weight (5.0-19.2 g), sexual maturation taking place simultaneously in individuals of both sexes at the age of 1 yr. It has a high spawning potentiality, represented by a relative fecundity attaining 181%, and an absoulte one, attaining 234%. The gono-somatic ratio is high, reaching at 3 yr the maximum values of 27%. The growth rate is intense at 1 yr. The condition factor represents maximum values (Q ±1.11) at the 3 yr old fishes. Measures are proposed for the elimination of these fish species from the fish culture station, by: the total drainage of the basin, followed by an attentive chlorination and installing afterwards some fine gauzes at the supply channels; the introduction of some predatory fish species, as pike-perch (Stizostedion lucioperca), in the moment when there are no carp fry in the pond, using the same system of gauzes; stocking carp fry only after removing completely the predatory fishes.--Copyright 1973, Biological Abstracts, Inc.
W74-02553

2J. Erosion and Sedimentation

A NEW OSCILLATING WATER TUNNEL,
Queen's Univ., Kingston (Ontario). Coastal Engineering Research Lab.
A. Brebner, and P. H. Riedel.
Journal of Hydraulic Research, Vol 11, No 2, p 107-121, 1973. 4 fig, 2 photo, 11 ref.

Descriptors: *Hydraulic models, *Waves (Water), *Erosion, *Unsteady flow, *Sediment transport, Scour, Sedimentation, Sedimentary structures, Ripple marks, Boundary layers, Turbulent flow.
Identifiers: Oscillating water tunnel.

An oscillating water tunnel with a 12-meter long working section of cross-sectional dimensions 0.5 x 1 meter was designed, built, and tested to simulate wave boundary layers for practically the full range of waves that may be produced in the sea or in wave flumes. The range of orbital amplitudes is 0.1 to 4 meters. The system may be used to determine bed shear stress at fixed beds, to study ripple form on a number of sediments with different specific gravities, and for conducting research into the fundamental properties of oscillatory boundary layers. Another use may be for the study of oscillatory flow around submerged objects such as pipelines or piles. (Knapp-USGS)
W74-02160

THE QUANTITY AND DIMENSIONS OF MICROORGANISMS IN BOTTOM SEDIMENTS OF FISH-BREEDING PONDS (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
For primary bibliographic entry see Field 08I.
W74-02228

THE RELATIONSHIPS BETWEEN LAND USE AND EROSION IN THE CENTRAL NORTH ISLAND, NEW ZEALAND,
Waikato Univ., Hamilton (New Zealand). Dept. of Earth Sciences.
For primary bibliographic entry see Field 04D.
W74-02287

SLOPE ASPECT AND TUNNEL EROSION IN THE LOESS OF BANKS PENINSULA, NEW ZEALAND,
New South Wales Univ., Kensington (Australia). School of Geography.
P. J. Hughes.
Journal of Hydrology (New Zealand), Vol 11, No 2, p 94-98, 1972. 2 fig, 5 ref.

Descriptors: *Erosion, *Loess, *Gully erosion, Gullies, *Slopes, Topography, Soil erosion.
Identifiers: Soil tunneling, *New Zealand (Banks Peninsula), *Tunnel erosion.

The relationship between slope aspect and tunnel erosion on Banks Peninsula, New Zealand, was measured. For a sample area of Banks Peninsula the ratio of the number of tunneled slopes to the total number of slopes potentially subject to tunneling was determined. This ratio represents the relative likelihood that a slope in a particular aspect class will be affected by tunneling. The results are presented in the form of a rose diagram. Slopes facing west to northwest are most likely, and slopes facing southeast to south-southwest least likely, to be affected by tunneling. (Knapp-USGS)
W74-02288

INVESTIGATION OF FALL VELOCITY OF SEDIMENTS IN MOUNTAIN STREAMS, (ISSLEDOVANIYE GIDRAVLICHESKOY KRUPNOSTI NANOSOV GORNYKH REK),
V. K. Debol'skiy, and L. D. Kogan.
Meteorologiya i Gidrologiya, No 4, p 59-63, April 1973. 3 fig, 1 tab, 6 ref.

Descriptors: *Sedimentology, *Settling velocity, Movement, *Particle shape, *Particle size, Coarse sediments, Sedimentation rates, Standing waters, Equations.

An equation of movement (fall) of a particle in standing water is considered. A general expression is presented for fall velocity of particles of irregular shape. The expression obtained is confirmed by experiments with coarse sediments up to 500 mm in size and by experiments carried out by other investigators. An expression is given for considering particle shape in determining fall velocity. (Josefson-USGS)
W74-02306

HYDROLOGIC EVALUATIONS IN BRIDGE PIER SCOUR DESIGN,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-02309

BED SCOUR AT END-DUMP CHANNEL CONSTRICTIONS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-02316

THE IMPORTANCE OF SEDIMENT TRANSPORT IN WATER RESOURCES PLANNING,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 04D.
W74-02351

AN IMPROVED BOTTOM-WATER SAMPLER,
University Coll. of Swansea (Wales). Dept. of Geology and Oceanography.
For primary bibliographic entry see Field 07B.
W74-02410

DIGITAL ANALYSIS OF POTOMAC RIVER BASIN ERTS IMAGERY: SEDIMENTATION LEVELS AT THE POTOMAC-ANACOSTIA CONFLUENCE AND STRIP MINING IN ALLEGHENY COUNTY, MARYLAND,
American Univ., Washington, D.C. Dept. of Biology.
For primary bibliographic entry see Field 07B.
W74-02583

A STUDY ON THE EROSION OF NIIGATA BEACH FROM ERTS-A IMAGERY,
Tokyo Univ. (Japan). Inst. of Industrial Science.
For primary bibliographic entry see Field 07B.
W74-02584

STORM RAINFALL IN THE BLACK SEA REGION AS A FACTOR IN SOIL EROSION,
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02B.
W74-02607

SEDIMENTATION AND SCOUR OFF NUCLEAR POWER PLANTS,
Wisconsin Univ., Madison. Marine Research Lab.
M. L. Kohler, and J. R. Moore.
Available from NTIS as COM-73-10562, $3.00 in paper copy; $1.45 in microfiche. Report No. WIS-SG-73-331, 1972. 21 p, 12 fig, 3 tab.

Descriptors: *Lake Michigan, Lakes, *Nuclear power plants, Sedimentation, Powerplants, *Scour, *Beach erosion, Discharge (Water), Environmental effects, *Wisconsin.
Identifiers: Nearshore processes.

The sedimentary regimes which are interacting in the nearshore zone of Lake Michigan are defined, to determine the short-term effects of the power plant upon the coastal sediments and to provide a base line study which can be used in future years to evaluate the possible long-term effects. Study of the sediments in the area of the Point Beach Nuclear Power Plant revealed the major transport and deposition trends in the region. A base line has been set for future examination of long term consequences of this use of the shore of Lake Michigan. Sand is transported through and past the northern half of the study area to be deposited in the southern half. The fact that the material in the south must move past the discharge plume to reach its site of deposition is of special importance. The heavy mineral data indicate lag deposits forming in the intermediate waters of the southern region rather than in the littoral zone. No disruption of this process by the discharge plume was found. The beach profile site sequences show that changes are occurring which cannot be explained by lake level changes. It is tentatively concluded that the beaches are eroding. Whether or not the water discharge is the direct cause of this phenomenon cannot be stated at this time. (Sinha-OEIS)
W74-02645

BULLETIN AND SUMMARY OF RESEARCH PROGRESS FISCAL YEARS 1970-71.
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-02647

RESEARCH PERTINENT TO ENVIRONMENTAL QUALITY CONCERNING THE PERIOD, 1967-1971.
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 02L.
W74-02648

DETAILED ANALYSIS OF SHORT-TERM VARIATIONS IN BEACH MORPHOLOGY (AND CONCURRENT DYNAMIC PROCESSES) FOR SUMMER AND WINTER PERIODS, 1971-1972, PLUM ISLAND, MASSACHUSETTS,
Massachusetts Univ., Amherst. Coastal Research Center.
For primary bibliographic entry see Field 02E.
W74-02649

2K. Chemical Processes

DETECTION OF POLLUTANTS IN WATER BY RAMAN SPECTROSCOPY,
Brown, Boveri und Cie, A.G., Heidelberg (West Germany).
For primary bibliographic entry see Field 05A.
W74-02164

OPTICAL CONSTANTS OF WATER IN THE 200-NM TO 200-MICROMETER WAVELENGTH REGION,
Missouri Univ., Kansas City. Dept. of Physics.
G. M. Hale, and M. R. Querry.
Applied Optics, Vol 12, No 3, p 555-563, March 1973. 6 fig, 1 tab, 59 ref.

Descriptors: *Ultraviolet radiation, *Infrared radiation, *Water properties, *Optical properties, Reviews, *Refractivity.
Identifiers: Optical constraints.

Extinction coefficients k (lambda) for water at 25C were determined through a broad spectral region by manually smoothing a point by point graph of k (lambda) vs wavelength lambda that was plotted for data obtained from a review of the scientific literature on the optical constants of water. Absorption bands representing k (lambda), were postulated where data were not available in the vacuum uv and soft x-ray regions. A subtractive Kramers-Kronig analysis of the combined postulated and smoothed portions of the k (lambda) spectrum provided the index of refraction n (lambda) for the spectral region 200 nm less than or equal to (lambda) less than or equal to 200 micrometer.
W74-02167

THE CHEMICAL COMPOSITION AND FLOW OF THE SOUTH WINTERBOURNE IN DORSET,
Freshwater Biological Association, Wareham (England). River Lab.
H. Casey, and P. V. R. Newton.
Freshwater Biol, Vol 2, No 3, p 229-234, 1972, Illus.
Identifiers: *Chemical composition, *Flow, *Nitrates, *United Kingdom (South Winterbourne).

Weekly observations were made of the South Winterbourne, England, from Oct. 1970-Dec. 1971. Flow commenced in Nov. 1970, and ceased in July 1971, a maximum flow of 1.51 m3 s-1 being recorded in Jan. 1971. The chemical composition was not very variable, but nitrate showed a positive correlation with flow.--Copyright 1973, Biological Abstracts, Inc.
W74-02190

SOIL POLLUTION FROM CATTLE FEEDLOTS IN GEORGIA,
Georgia Univ., Athens. Dept. of Agronomy.
For primary bibliographic entry see Field 05B.
W74-02210

THE EFFECTS OF TRACE METALS ON GROUND WATER QUALITY AS INFLUENCED BY SOILS REFLECTING DIFFERENCES IN ORGANIC MATTER CONTENT AND GENETIC CONDITIONS,
Tuskegee Inst., Ala.
For primary bibliographic entry see Field 05B.
W74-02211

STRONTIUM, CALCIUM AND THE ISOTOPIC COMPOSITION OF STRONTIUM IN UNDERGROUND WATERS FROM THE SCIOTO RIVER BASIN, OHIO,
Miami Univ., Oxford, Ohio. Dept. of Geology.
For primary bibliographic entry see Field 02F.
W74-02218

STUDY OF THE INTRACELLULAR WATER STATE IN PLANTS UNDER THE EFFECT OF PHENOLS, (IN RUSSIAN),
Voronezhskii Lesotekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 02I.
W74-02234

MIGRATION OF SUBSTANCES WITH SURFACE AND GRAVITATIONAL WATERS IN SOILS OF GEOCHEMICALLY RELATED LANDSCAPES OF BARABA, (MIGRATSIYA VESHCHESTV S PVERKHNOSTNYMI I GRAVITATSIONNYMI VODAMI V POCHVAKH GEOKHIMICHESKI SOPRYAZHENNYKH LANDSHAFTOV BARABY),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
For primary bibliographic entry see Field 02G.
W74-02300

WATER RESOURCES OF LEE COUNTY, MISSISSIPPI,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04B.
W74-02340

SEPARATION AND IDENTIFICATION OF METAL DITHIZONATES BY THIN-LAYER CHROMATOGRAPHY AND ITS APPLICATION IN TOXICOLOGICAL ANALYSIS,
Chemical Examiner's Lab., Agra (India). Toxicology Div.
For primary bibliographic entry see Field 05A.
W74-02360

EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF VANADIUM AS A MIXED LIGAND COMPLEX OF OXINE AND AZIDE,
Andhra Univ., Waltair (India). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-02362

PYRIDINE KETOXIMES AS ANALYTICAL REAGENTS: THE SPECTROPHOTOMETRIC DETERMINATION OF COBALT WITH 2--PYRIDYL-2-THIENYL-BETA-KETOXIME,
Windsor Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-02364

ANALYTICAL APPLICATIONS OF GAS CHROMATOGRAPHY OF METAL CHELATES,
Birmingham Univ. (England). Dept. of Chemistry.
R. S. Barratt.
Proceedings of the Society for Analytical Chemistry, Vol 10, No 7, p 167-170, July 1973. 3 fig, 18 ref.

Descriptors: *Heavy metals, *Beryllium, *Gas chromatography, *Chlorides, *Chelation, Chromium, Nickel, Copper, Cobalt, Separation techniques, Alkaline earth metals.
Identifiers: Detection limits, Recovery, Chemical interference, Chelating agents, Sample preparation, Metal chelates.

A general summary is given of methods of chelating metals, namely Be, Cr, Ni, Cu, and Co for analysis by gas chromatography. Chelating agents, recovery, detection limits, interferences, and chemical structures of several chelates are discussed. The use of gas chromatography for determination of chloride ions is also described. (Little-Battelle)
W74-02366

DETERMINATION OF TRACE AMOUNTS OF CHROMIUM BY ATOMIC ABSORPTION SPECTROMETRY WITH A TANTALUM FILAMENT ATOMIZER,
Nagoya Univ. (Japan). Dept. of Synthetic Chemistry.
T. Maruta, and T. Takeuchi.
Analytica Chimica Acta, Vol 66, No 1, p 5-11, August 1973. 3 fig, 3 tab, 6 ref.

Descriptors: *Chromium, *Aqueous solutions, *Pollutant identification, Heavy metals, Chemical analysis, Alkaline earth metals, Temperature, Methodology, Sodium, Magnesium, Calcium, Strontium, Aluminum, Vanadium, Molybdenum, Manganese, Iron, Cobalt, Nickel, Copper, Cations, Instrumentation.
Identifiers: *Atomic absorption spectrophotometry, *Ionic interference, *Tantalum filament atomizer, Precision, Dectection limits, Sensitivity, Trace levels.

The effect of various foreign ions on chromium absorption in atomic absorption spectrometry was examined with a modified tantalum filament atomizer. The sample solution containing Cr was vaporized and atomized from a tantalum filament by electrical heating into an argon stream within an absorption chamber. All atomic absorption signals were recorded with the height of the absorption signal being used to determine the concentration of Cr. The highest absorption signal was obtained when the filament temperature level (1650 degrees) was the lowest. The detection limit of this method was found to be 0.94 pg and the sensitivity was 0.52 pg. Ten determinations using 6 ppm Cr solution gave a coefficient of variation of 2.8 percent. The effects of 100-, 50- or 10-fold weights of 12 different metal ions on the absorption signal in a 6 ppm Cr solution were measured at various temperatures. No interferences of Fe, Cu, Mn, Al or Na were observed irrespective both of concentrations and filament temperature levels; Fe did not interfere even at a 300-fold amount. No interference was observed at the 10-fold level with the exception of alkaline earth elements and V. The proposed technique is very rapid as a complete single analysis of the aqueous sample requires only 2 min. There are no memory effects between determinations. The most prominent advantages of the proposed method of atomization are its high sensitivity, simplicity and rapidity. (Holoman-Battelle)
W74-02367

EXTRACTION OF BORIC ACID WITH ALIPHATIC 1,3-DIOLS AND OTHER CHELATING AGENTS,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 05A.
W74-02368

SAMPLING TECHNIQUES IN CHROMATOGRAPHY,
Waterloo Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 07B.
W74-02372

INTERPRETATION OF INFRARED SPECTA USING PATTERN RECOGNITION TECHNIQUES,
Pennsylvania State Univ., University Park. Dept. of Chemistry.
R. W. Liddell, III, and P. C. Jurs.
Applied Spectroscopy, Vol 27, No 5, p 371-376, September/October 1973. 2 fig, 3 tab, 9 ref.

Descriptors: *Computer programs, *Data processing, *Pollutant identification, *Organic compounds, Computer models, Alcohols.
Identifiers: *Infrared spectra, *Pattern recognition, Carbonyls, Cyclohexanes, Ketones, Esters, Benzene, Ethers, Infrared spectrophotometry.

The pattern recognition technique utilizing adaptive binary pattern classifiers has been applied to the interpretation of infrared spectra for carbonyls, cyclohexanes, alcohols, ketones, esters, benzene, and ethers. The binary pattern classifiers were trained to determine the chemical classes of x-y digitized infrared spectra. High predictive abilities were obtained in classifying unknown spectra. A new training procedure for binary pattern classifiers was developed and used to classify ir spectra into chemical classes. Pattern classifiers trained in the conventional way and by the new procedure were used in conjunction with feature selection, and it is shown that a small fraction of the data is necessary to classify these infrared spectra successfully into chemical classes. (Little-Battelle)
W74-02376

ANALYZING HEAVY ENDS OF CRUDE,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 05A.
W74-02378

ANALYSIS OF HIGH-PURITY WATER BY FLAMELESS ATOMIC-ABSORPTION SPECTROSCOPY. PART II. SIGNAL INTEGRATION WITH A NON-RESONANCE LINE CORRECTION SYSTEM FOR SPURIOUS ABSORPTION PHENOMENA,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 05A.
W74-02385

A MODIFIED EXTRACTION METHOD FOR DETERMINATION OF MINERAL OIL IN SEA WATER,
For primary bibliographic entry see Field 05A.
W74-02388

APPLICATIONS, INVOLVING THE IODIDE ION. VIII. DIRECT AND INDIRECT DETERMINATION OF MERCURY (I) AND ANALYSIS OF MIXTURES. ANALYSIS OF CHROMIUM (VI)-CHROMIUM (III) MIXTURES. DETERMINATION OF HYPOCHLORITE,
Cairo Univ., Giza (Egypt). Faculty of Science.
For primary bibliographic entry see Field 05A.
W74-02395

A HIGH-SPEED LIQUID CHROMATOGRAPH WITH A FLOW-SPECTROFLUORIMETRIC DETECTOR AND THE ULTRAMICRO-DETERMINATION OF AROMATIC COMPOUNDS,
Kyoto Univ. (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-02397

ION-EXCHANGE SEPARATIONS ON MIXED COLUMNS,
Tokyo Univ. (Japan). Inst. of Industrial Science.
For primary bibliographic entry see Field 05A.
W74-02398

DETERMINATION OF ZINC BY FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Ohio State Univ., Columbus. Coll. of Medicine.
For primary bibliographic entry see Field 05A.
W74-02399

NUCLEAR MAGNETIC RESONANCE RELAXATION TITRATION,
Technische Hochschule, Darmstadt (West Germany). Eduard-Zintl-Institut.
A. Schluter, and A. Weiss.
Zeitschrift fur Analytische Chemie, Vol 266, No 3, p 177-186, August 30, 1973. 8 fig, 1 tab, 24 ref.

Descriptors: Methodology, *Aqueous solutions, Chemical precipitation, Chemical analysis, Chemical reactions, *Nuclear magnetic resonance, Volumetric analysis, Visosity, Iron, Nickel, Copper, Pollutant identification.
Identifiers: Quantitative analysis, *NMR relaxation titration, Paramagnetic ions, *Metal complexes, Accuracy, Detection limits, Chemical concentration, Sensitivity, Dichromates, Cerium, Complexometric titration, Redox titration, alpha-Benzoinoxime, Complexation.

Quantitative determination of the concentration of paramagnetic ions in aqueous solutions is performed by NMR relaxation titration. By measurement of the nuclear spin-lattice relaxation time T sub 1 or the nuclear spin-spin relaxation time T sub 2 redox titrations and complexometric determinations of the concentration of paramagnetic ions are possible. Also the precipitation of ions from the solution can be followed by this method. The use of a magnetic indicator in this analytical method is shown. The sensitivity of the method goes down to concentrations as low as 0.001 M. The accuracy of NMR relaxation titration is better than 1 percent. A number of applications of the method are given. (Holoman-Battelle)
W74-02402

SELECTION OF EXPERIMENTAL CONDITIONS FOR THE PHOTOMETRIC COMPLEX FORMATION TITRATIONS OF METALS IN THE PPM-RANGE,
Amsterdam Univ. (Netherlands). Physics Lab.
For primary bibliographic entry see Field 05A.
W74-02404

ANALYSIS BY MEANS OF GAS BUBBLE ELECTRIFICATION,
Imperial Coll. of Science and Technology, London (England). Dept. of Metallurgy.
D. A. Pantony, and D. C. Stagg.
Zeitschrift fue Analytische Chemie, Vol 264, No 5, p 348-353, June 13, 1973. 8 fig, 1 tab, 7 ref.

Descriptors: *Chemical analysis, *Solutes, *Aqueous solutions, *Volumetric analysis, Electrolytes.
Identifiers: *Gas bubble electrification, Acid-base titration, Complexiметric titration, Acetic acid, Nickel chloride, Trisodium trimetaphosphate, Trisodium orthophosphate, Tetrasodium pyrophosphate, Pentasodium triphosphate, Titrimetry.

A simple theory is proposed to account for the reciprocal relationship between concentration of solute and the charge on a droplet ejected as a rising bubble bursts at a solution's surface. Reasonable agreement is found between theoretical predictions of charge in multivalent electrolytes and the experimental values. Application to continuous analysis of flowing systems and to end-point detection is demonstrated for acid-base and complexiметric titrations. (Holoman-Battelle)
W74-02406

A PNEUMATIC SAMPLE CHANGER FOR GAMMA-RAY SPECTROSCOPY,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07B.
W74-02407

HANGING MERCURY DROP ELECTRODEPOSITION TECHNIQUE FOR CARBON FILAMENT FLAMELESS ATOMIC ABSORPTION ANALYSIS. APPLICATION TO THE DETERMINATION OF COPPER IN SEA WATER,
Texas Univ., Austin. Dept. of Chemistry.
C. Fairless, and A. J. Bard.
Analytical Chemistry, Vol 45, No 13, p 2289-2291, November 1973. 2 fig, 1 tab, 25 ref.

Descriptors: *Copper, *Seawater, *Chemical analysis, Methodology, *Pollutant identification, Trace elements, *Electrochemistry, Heavy metals, Water analysis, Electrolysis, Laboratory equipment, Pollutants, Water pollution.
Identifiers: Hanging mercury drop electrode, Carbon filament, Flameless atomic absorption spectrophotometry, Controlled potential electrolysis, Detection limits, Accuracy, Electrodeposition, Volatilization, Precision.

Controlled potential electrolysis at a hanging mercury drop electrode (HMDE) has been coupled with carbon filament atomic absorption as an analytical technique and applied to the determination of Cu in seawater. Synthetic seawater and natural seawater samples were analyzed. Timed electrolyses at a controlled potential of -0.35 V vs. SCE were conducted with a simple three-electrode arrangement. Deaeration of analysis solutions was accomplished by bubbling N2 for 5 min prior to electrolysis and then by passing N2 over the solution during electrolysis. After electrolysis. After electrolysis relaxation losses were examined. Five microliters of p-xylene was used to pretreat the filament cavity. The mercury was volatilized completely by heating the filament at approximately 425 C, then the Cu was atomized. Accuracy was checked by the standard additions method. The natural seawater analysis gave 0.72 microgram Cu/l which is within the range for unpolluted seawater. The practical detection limit for this technique with this electrode configuration, solution volume, and electrolysis time is 0.2 microgram Cu/l. The absolute detection limit of the carbon filament atomizer is about 0.5 pg of Cu (essentially the same value as the sensitivity per 1 percent absorption). These results indicate that this is a suitable technique for the determination of Cu in unpolluted seawater with matrix interferences apparently eliminated and selective volatilization of Hg without covolatilization of Cu accomplished. In addition, in this technique, sample size is limited only by the electrolysis apparatus configuration, total amount of trace metal, and time, and is not restricted to the microliter capacity of the carbon filament. (Holoman-Battelle)
W74-02411

ADSORPTION CHARACTERISTICS OF SILBER, LEAD, CADMIUM, ZINC, AND NICKEL ON BOROSILICATE GLASS, POLYETHYLENE, AND POLYPROPYLENE CONTAINER SURFACES,
Chadron State Coll., Neb.
For primary bibliographic entry see Field 05A.
W74-02412

HIGH PRECISION SAMPLING FOR CHROMATOGRAPHIC SEPARATIONS,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
B. E. Bowen, S. P. Cram, J. E. Leitner, and R. L. Wade.
Analytical Chemistry, Vol 45, No 13, p 2185-2191, November 1973. 10 fig, 4 tab, 42 ref.

Descriptors: *Separation techniques, *Chromatography, *Automatic control, Computers, Hydraulic valves, High pressure valves, Gas chromatography, Data collections, Algorithms, Flow rates, Sampling, Digital computers.
Identifiers: Precision, *Chromatographic sampling valves, Hybrid-fluidic valves, Data acquisition, Hamilton valves, Carrier gas.

The precision of several chromatographic sampling valves of original design is shown to approach 0.05 percent for unretained solutes. Hybrid-fluidic, high pressure, and commercial valves have been characterized by measuring the precision of their column input profiles and statistical moments. A computer-based data acquisition and control system was developed for use the high precision algorithms. (Holoman-Battelle)
W74-02414

EXPERIMENTAL STUDY OF THE PHASE--SELECTIVE ANODIC STRIPPING ANALYSIS OF MICROMOLAR CADMIUM (II) AT THE MICROMETER HANGING MERCURY DROP ELECTRODE IN 0.1 M POTASSIUM CHLORIDE,
Kentucky Univ., Lexington. Dept. of Chemical Engineering.
E. D. Moorhead, and P. H. Davis.
Analytical Chemistry, Vol 45, No 13, p 2178-2184, November 1973. 5 fig, 3 tab, 28 ref.

Descriptors: *Cadmium, *Chemical analysis, *Electrochemistry, *Aqueous solutions, Electrolytes, Heavy metals, Methodology, Electrolysis, Trace elements.
Identifiers: Hanging mercury drop electrodes, Phase-selective anodic stripping, as Phase-selective voltammetry, Chemical concentration, Trace levels, Reproducibility, Sensitivity, Anodic stripping voltammetry, as Polarography, Potassium chloride.

Conflicting reports in the literature pertaining to the observed magnitude of the ac phase-selective current obtained in the anodic stripping of Cd from the HMDE prompted an experimental reassessment of the stripping behavior of this metal using a micrometer-type HMDE and 0.1 M KCl as base electrolyte. Reproducibility of the stripping analysis was indicated by a 1.20 percent average deviation in the measured peak height obtained for ten independent runs at the micromolar Cd (II) level. The functional dependence of peak height on signal frequency, applied ac voltage, and cadmium concentration conformed to theory developed previously for ac polarography. However, observed in-phase peak currents obtained during the stripping step were substantially smaller than those reported by previous authors for the same experiment. The influence of stripping scan rate on the Cd-Cd (Hg) system was examined, and peak heights were found to be strongly dependent on this parameter. The importance of maintaining well-controlled conditions during pre-electrolysis was indicated from brief studies of peak height dependence on solution volume and stirring rate. (Holoman-Battelle)
W74-02415

AN AUTOMATED ANALYSIS FOR UREA IN SEAWATER,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 05A.
W74-02421

SALINITY CORRECTIONS FOR DISSOLVED OXYGEN MEASUREMENTS,
National Oceanographic Instrumentation Center, Washington, D.C.
For primary bibliographic entry see Field 05A.
W74-02424

COMPARING THE QUALITY OF OUR WATERS,
Orlando Labs., Inc., Fla.
For primary bibliographic entry see Field 05A.
W74-02428

POTENTIALITY OF THE COUPLING OF COLUMN LIQUID CHROMATOGRAPHY AND FIELD DESORPTION MASS SPECTROMETRY,
Bonn Univ. (West Germany). Institut fuer Physikalische Chemie.
H. D. Beckey.
Journal of Chromatography, Vol 83, p 315-320, August 29, 1973. 6 fig, 16 ref.

Descriptors: *Separation techniques, *Organic compounds, *Pollutant identification, *Mass spectrometry, Molecular structure, *Chromatography.
Identifiers: Column liquid chromatography, Field desorption mass spectrometry, Sample preparation, F mass spectra, Detection limits, Steroids, Molecular ions, Mass spectra, Spectrophotometric detector, Corticosterone, Progesterone, Prednisolone, Desorption, Ionization.

The first use of column liquid chromatography in combination with field desorption mass spectrometry is exemplified by the separation and identification of the components of a steroid mixture extracted from rat serum. There are two main reasons for the high-molecular-ion intensities obtained: (1) the smaller transferred energy in the field ionization process compared with other ionization modes increases the chance of detecting the intact molecular ions; and (2) the samples are not introduced via the commonly used direct introduction system for evaporation, but are applied to the field ion emitter from a solution using the emitter dipping technique. Hence ionization and desorption of the adsorbed molecules can be performed with minimum thermal stress. Potential applications for the coupling of liquid chromatography and field desorption mass spectrometry are discussed, especially in relation to the handling of the sample and the limits of detection. (Holoman-Battelle)
W74-02430

ANIONIC EXCHANGE SEPARATIONS OF THE ELEMENTS THAT CAN BE EXTRACTED WITH TRIBUTYL PHOSPHATE. II, (ANIONENAUSTAUSCHTRENNUNGEN DER MIT TRIBUTYLPHOSPHAT EXTRAHIERBAREN ELEMENTE. II),
Vienna Univ. (Austria). Analytisches Institut.
W. Koch, and J. Korkisch.
Mikrochimica Acta, No 1, p 101-112, 1973. 3 fig, 4 tab, 14 ref.

Descriptors: *Chemical analysis, *Separation techniques, *Spectrophotometry, Ion exchange, Aqueous solutions, Adsorption, *Anion exchange.
Identifiers: *Germanium, Chemical interference.

A very sensitive and selective method for the spectrophotometric determination of germanium has been described employing pyrocatechol violet. Prior to the determination, the germanium is first accumulated by extraction with tributyl phosphate (TBP) and kerosene and then separated from the co-extracted elements that interfere with the determination, by means of the strongly basic anion-exchanger Dowex 1,X8 in a mixture consisting of 30 vol. percent TBP, 60 vol. percent methlglycol and 10 vol. percent 12 N hydrochloric acid. In addition it was shown that this mixture is well suited to separate uranium quantitatively from germanium. The spectrophotometric determination of germanium is interfered with by V (V), Mo (VI), Ga (III), Tl (III), Sb (III), Sn (II) and Fe (III). The interference by iron can be averted by adding sodium-potassium tartrate. (Little-Battelle)
W74-02432

NATURE AND STABILITY OF COMPLEX MERCURY COMPOUNDS IN SURFACE AND GROUND WATERS,
Auburn Univ. Ala. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W74-02441

NITROGEN, PHOSPHORUS, AND TRACE ELEMENTS IN FLORIDA SURFACE WATERS, 1970-71,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05A.
W74-02476

HYDROLOGY AND WATER RESOURCES OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-02480

ON THE CHARACTERISTICS OF SALT INTRUSION IN THE KITAKAMI RIVER, MIYAGI PREFECTURE (IN JAPANESE),
Japanese Society of Limnology, Otsu (Japan).
For primary bibliographic entry see Field 05B.
W74-02541

OCCURRENCE OF SILICA IN THE NATURAL WATERS OF THE HUNTLEY-ROBERTSON DISTRICT, SOUTHERN NEW SOUTH WALES,
New South Wales Dept. of Mines, Sydney (Australia). Chemical Lab.
M. Johnson, and W. D. Johnson.
Aust J Mar Freshwater Res. Vol 23, No 2, p 105-119. 1972. Illus.
Identifiers: *Australia (N.S.W.), Natural waters, *Silica.

The silica concentrations of both ground and surface waters from the Triassic Hawkesbury Sandstone (New South Wales, Australia) were found to range from 3.0-12.0 ppm. Samples of soil, surface bedrock, and fresh core material were leached with water, and the results of chemical analyses carried out on the subsequent solutions are discussed with reference to the source of the silica is solution. A time study of the release of soluble silica from sandstone indicated rapid dissolution within the first few days, with equilibrium concentration being reached after a period of several weeks due to inhibiting surface reaction on the mineral grains. A possible explanation, based on the effects of weathering and the impervious nature of the sandstone, is suggested to account for the similarity between the silica concentrations of surface water and groundwater.--Copyright 1973, Biological Abstracts, Inc.
W74-02555

TOTAL ISOTOPIC COMPOSITION AND HYDROCHEMICAL CHARACTERISTICS OF NATURAL WATERS IN NORTHWESTERN AND NORTHERN FERGANA (SUMMARNYY IZOTOPNYY SOSTAV I GIDROKHIMICHESKIYE OSOBENNOSTI PRIRODNYKH VOD SEVERO-ZAPADNOY I SEVERNOY FERGANY),
Tashkent Univ. (USSR).
A. S. Uklonskiy, V. I. Popov, S. T. Badalov, L. D. Shpora, and V. M. Glushchenko.
Uzbekskiy Geologicheskiy Zhurnal, No 1, p 60-63, 1973. 4 ref.

Descriptors: *Water chemistry, *Water quality, *Isotope studies, *Structural geology, Folds (Geologic), Geologic time, Metals, Oxygen, Mixing, Oily water, Meteoric water, Water analysis, Water sampling.
Identifiers: *USSR, *Fergana.

The presence of a relation between isotopic and chemical composition of waters makes it possible to (1) determine boundaries of modern transgressions and regressions of oily water, (2) locate discharge areas of groundwater of varied origin, and (3) identify mixing zones of descending oxygen and ascending oxygen-free waters. Favorable geochemical barriers for precipitation of ores of many elements can be constructed in mixing zones of descending oxygen and ascending oxygen-free waters. On the basis of isotopic and chemical composition of waters, four regions favorable to formation of deep mixing zones are identified: the Varzyk ore region of copper-bearing sandstone; the southeastern limb of the Chustpapskaya anticline (from Kattasay to Almassay); the pericline and periclinal strata of the northwestern limb of Supetau; and the pericline and southeastern limb of the Karagundayskiy structural nose. (Josefson-USGS)
W74-02608

CHEMICAL CHARACTERISTICS OF SURFACE WATERS IN THE UPPER CHIRCHIK RIVER BASIN (KHIMICHESKAYA KHARAKTERISTIKA POVERKHNOSTNYKH VOD VERKHNEY CHASTI BASSEYNA R. CHIRCHIK),
Akademiya Nauk Ubzekskoi SSR, Tashkent. Institut Seismologii.
G. Kh. Umarova.
Uzbekskiy Geologicheskiy Zhurnal, No 3, p 34-37, 1973. 2 tab, 3 ref.

Descriptors: *Surface waters, *Water chemistry, *Water quality, *Water properties, Water types, Water analysis, Chemical analysis, Inorganic compounds, Ions, Water sampling.
Identifiers: *USSR, *Chirchik River.

Water samples were collected and analyzed to determine the chemical composition of surface waters of the Ugam, Bel'dershay, Chimgansay, Avgansay, and other rivers in the Chirchik River basin in Uzbekistan. The salinity of the waters is weak (0.220-0.285 g/liter). The maximum amount of dissolved solids is 0.575 g/liter (lower reaches of the Azadbashsay River). The chemical composition of the waters is of the bicarbonate-sulfate-calcium-magnesium (predominant) and bicarbonate-sulfate-sodium-magnesium types. Hydrogen ion concenttation is 7.8-8.2. Hardness characteristics range from soft to moderately hard. The chemical composition of the waters is directly correlated with the lithological composition of the rocks comprising the region. Results of chemical analyses of water samples collected from upper reaches of the Chirchik River are tabulated. (Josefson-USGS)
W74-02612

SUMMARY OF HYDROLOGIC CONDITIONS IN COLLIER COUNTY, FLORIDA, 1972,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 02A.
W74-02622

2L. Estuaries

DISPERSION IN FLOW FROM A CONTINUOUS SOURCE AT SEA,
Liverpool Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-02163

APPROACHES TO STATE COASTAL MANAGEMENT,
Rhode Island Univ., Kingston. Coastal Resources Center.
M. J. Grant.
Available from NTIS, Springfield, Va. 22151 as COM-73-10511 - Price $3.00 printed copy; $1.45

microfiche. Rhode Island University Marine Bulletin, Series No. 13, January 1973. 7 p, 2 tab.

Descriptors: *Coastal engineering, *Shore protection, *Projects, *State governments, Beach erosion, Erosion control, Sediment control, Reviews, Management.

This summary examination of the peculiarities of individual state approaches to coastal management is divided into: (1) no significant activity, (2) comparable efforts, (3) planning, (4) moratorium, (5) active management, and (6) State guidelines-local action. (Woodard-USGS)
W74-02185

A SELF-DRAINING SUBSURFACE RAINFALL CONSERVATION SYSTEM: ITS EFFECT ON THE SOIL WATER STATUS AND PRODUCTIVITY OF COASTAL PLAINS SANDS,
Rhodesia Univ., Sailsbury. Dept. of Agriculture.
For primary bibliographic entry see Field 02G.
W74-02193

APPLICABILITY OF THE INTERCEPTOR WATERWAY CONCEPT TO THE ROOKERY BAY SANCTUARY,
Tropical Bioindustries Development Co., South Miami, Fla.
For primary bibliographic entry see Field 04A.
W74-02205

BOLINAS LAGOON, MARIN COUNTY, CALIFORNIA, SUMMARY OF SEDIMENTATION AND HYDROLOGY, 1967-69,
Geological Survey, Menlo Park, Calif.
J. R. Ritter, and W. M. Brown, III.
Available from NTIS, Springfield, Va. 22151, PB-224 080/AS; Price $3.00 printed copy; $1.45 microfiche. Water-Resources Investigations 19-73, August 1973. 74 p, 32 fig, 7 tab, 103 ref.

Descriptors: *Sedimentation rates, *Hydrology, *Lagoons, *California, Sediment transport, Tidal effects, Estuaries, Erosion, Littoral drift, Winds, Sands, Topography, Vegetation, Streamflow, Hydrologic data, Sediment load.
Identifiers: *Bolinas Lagoon (Calif.).

Sedimentation in Bolinas Lagoon, a 1,100-acre lagoon 15 miles northwest of San Francisco, presently averages about 16 acre-feet per year. This value has been determined from rates of 21 acre-feet per year from net sediment budget studies, 16 acre-feet per year from topographic surveys of the lagoon bottom in 1939 and 1968, and 11 acre-feet per year computed from geological evidence. At the indicated rates the deposition in the lagoon would average 0.5 to 1.0 foot in the next 50 years, and the lagoon would fill to the highest high water level in 340 to 650 years. Studies from 1967 to 1969 indicated that approximately 80 acre-feet of sediment was transported into and 86 acre-feet was transported out of Bolinas Lagoon annually by tidal flows. Cliff erosion west of the inlet and littoral drift provided the principal sources of the sediment transported into the lagoon flood-tides. Winds and streamflow brought additional sediment into the lagoon, and shore erosion contributed a minor part. Measurements of tidal flows and suspended-sediment discharge in the lagoon inlet showed that: (1) most of the suspended sediment is sand, (2) the average velocity was as much as 4.9 feet per second, (3) instantaneous suspended-sediment discharge reached rates as large as 11,600 tons per day on an ebbtide, (4) tidal flows ranged from 180 to 2,800 acre-feet, and (5) corresponding suspended-sediment discharge ranged from 3 to 1,200 tons. (Woodard-USGS)
W74-02296

SURFACE AND INTERNAL WAVES, (POVERKHNOSTNYYE I VNUTRENNIYE VOLNY),
Akademiya Nauk URSR, Sevastopol. Marine Hydrophysics Inst.
For primary bibliographic entry see Field 02E.
W74-02299

WATER RESOURCES DEVELOPMENT IN THE MULLICA RIVER BASIN,
College of South Jersey, Camden. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-02450

RESEARCH IN THE COASTAL AND OCEANIC ENVIRONMENT,
Delaware Univ., Newark.
W. S. Gaither.
Available from NTIS, Springfield, Va. 22151 as AD-759 878 Price $3.00 printed copy; $1.45 microfiche. Annual Status Report, September 1971. 28 p, 12 fig, 8 ref. ONR N00014-69-10040Z.

Descriptors: *Littoral drift, *Sediment transport, *Coasts, *Delaware, Environmental effects, Vegetation effects, Ocean currents, Tidal effects, Estuaries, Geomorphology, Data collections, Sedimentation, Soil types, Waves (Water), Coastal marshes, Phosphates, Biochemistry, Shores, New Jersey, Maryland, Correlation analysis, Evaluation, Environmental control.

Progress during the second year of a multidisciplinary study of a section of the Atlantic seacoast (Delaware and adjacent areas of New Jersey and Maryland) is summarized. New knowledge of coastal geology and geologic history has been developed, and the properties of soils sediments in nearshore, beach, and backshore locations have been more fully determined. Continued theoretical investigations of wave action, model studies of sedimentary processes and underground water behavior, and the results of additional observations of vegetative growth and of surface energy exchanges are reported. Future objectives, particularly in the area of coastal zone remote sensing, are outlined. This study, sponsored by the Geography Branch of the Office of Naval Research, is intended to provide thorough basic knowledge of this representative coastal zone that can be applied to similar littoral areas throughout the world to identify offshore, tidal zone, beach, and backshore surface and subsurface features from limited and preferably remote observations. (Woodard-USGS)
W74-02481

GUIDELINES FOR THE COASTAL ZONE.
Coastal Plains Center for Marine Development Services, Wilmington, N.C.

Publication 73-5 July 1973. 14 p.

Descriptors: *Coastal plains, *Land use, *Land classification, *Water use, Land resources, Land development, Water resources development, Zoning, Land management, Water management, Comprehensive planning, Social aspects, Political aspects, Multiple-purpose projects.
Identifiers: Coastal zone management.

The Coastal Zone Management Act, which became law in October of 1972, encourages states to develop tools for the long-term planning and management of invaluable and irreplaceable coastal resources. To assist the coastal states, grants were authorized for the development of a coastal zone management program including a comprehensive statement in words, maps, illustrations, and other media of communication setting forth objectives, policies, and standards to guide public and private uses of lands and waters in the coastal zone. The primary purposes of the publication are to assist in the development of such plans, and to provide guidelines for coastal zone use and development. The guidelines comprised two major parts. First, the section on classifications of land and water addresses the questions of whether development is suitable at all and if so, what types and in what areas; and if not, what other uses are suitable. Secondly, the section on usage considerations deals primarily with how development should take place, precautions needed to be taken, and the rationale which supports this criterion. (Daniels-Florida)
W74-02510

USE OF ERTS-1 IN COASTAL STUDIES,
Army Coastal Engineering Research Center, Washington, D.C.
O. T. Magoon.
In: Proceedings of NASA/Goddard Space Flight Center ERTS-1 Symposium, September 29, 1973. p 108-116, 1973. 11 ref, 4 plates.

Descriptors: Natural resources, *Photography, *Coasts, Barrier islands, *Shallow water, *Waves (Water), *Satellites (Artificial), *Remote sensing.
Identifiers: ERTS-1 imagery.

A few possibilities of the use of ERTS-1 imagery in coastal studies are summarized. An obvious application is in obtaining regional views of extended coastal areas. Other applications referred to are coastal configuration, barrier islands, underwater penetration, and coastal waves. Samples of ERTS-1 imagery are included. (Sinha-OEIS)
W74-02633

SEASONAL AND AREAL DISTRIBUTION AND ABUNDANCE OF THE COPEPODA IN A MISSISSIPPI ESTUARINE SYSTEM,
Mississippi Marine Conservation Commission, Biloxi.
H. M. Perry.
Available from NTIS as COM-72-11175, $3.00 in paper copy; $1.45 in microfiche. MS thesis, University of Southern Mississippi, June 1970. 80 p, 12 fig, 13 tab, 59 ref, append. NOAA, NMFS 2-25-R.

Descriptors: *Bioindicators, Mississippi, Coasts, *Ecological distribution, *Copepods, Seasonal Spatial distribution, Hydrography, *Estuaries, *Sounds, *Crustaceans, Inland waterways, Pollutant identification, Water pollution.
Identifiers: *Mississippi Sound.

Copepoda are crustaceans of special interest because of their possible use as biological indicators of specific water masses. A knowledge of the seasonal and areal distribution and abundance of these organisms in the Mississippi Sound would serve a useful purpose not only from the standpoint of commercial fisheries, but also from the standpoint that they may be useful tools for making inferences concerning the hydrography of this area in future studies. The purposes of this investigation were to determine: (1) the various species of free-living copepods present in the area of Mississippi Sound under study; (2) the numerical abundance of each species determined monthly for a period of one year; (3) the seasonal and areal distribution and abundance of these organisms; and (4) the physical conditions under which each species occurs. (Sinha-OEIS)
W74-02637

WAVE BREAKING IN SHALLOW WATER,
Army Coastal Engineering Research Center, Washington, D.C.
C. J. Galvin, Jr.
In: Waves on Beaches and Resulting Sediment Transport, Academic Press, Inc., 1972. p 413-456. 12 fig, 5 tab, 50 ref.

Descriptors: *Waves (Water), *Shallow water, *Beaches, *Coasts.

Identifiers: Wave speed, *Breakers, Solitary waves, Beach slope, Oscillatory waves, Wave shape.

Deep water steepness and beach slope determine breaker type and breaker depth-to-height ratio. High initial deep water steepness induces breaking in deeper water since steepness grows faster than height. Slope determines the extent of nonlinear changes in wave shape, which occur at a slow rate relative to wave speed. Slow shape changes accompanying soliton development significantly affect the breaking of oscillatory waves and provide plausible explanations for data on the breaking of solitary waves. Empirical knowledge of the breaking process is summarized for reference by those preparing theoretical studies of the breaking process. (Sinha-OEIS)
W74-02638

PUGET SOUND RESIDENT COHO SALMON STUDY,
Washington State Dept. of Fisheries, Olympia.
F. Haw.
Available from NTIS as COM-72-11060, $3.00 in paper copy; $1.45 in microfiche. Completion Report, August 1970. 12 p, 4 fig, 6 tab. NOAA, NMFS AFC-35.

Descriptors: *Washington, Salmon, Fish populations, *Sounds, Recreation, Sport fish, *Migration, Estuarine fisheries, Coasts, *Fish management, Fisheries, Resources development.
Identifiers: *Coho salmon, *Puget Sound (Wash).

Fin-marking studies have indicated that the coho salmon artificially produced in Puget Sound hatcheries tend to move out to forage along the outer coast of British Columbia and Washington, while the in-Sound resident population results primarily from certain natural spawning races. When the hatchery-produced fish return to Puget Sound on their spawning migration, they are no longer feeding and are thus difficult to catch on sport gear. (Sinha-OEIS)
W74-02639

DEVELOPMENT OF A MATHEMATICAL MODEL TO PREDICT THE OCCURRENCE OF CYNOSCION ARENARIUS IN MISSISSIPPI ESTUARIES,
Mississippi Marine Conservation Commission, Biloxi.
C. K. Eleuterius.
Available from NTIS as COM-72-11197, $3.00 in paper copy; $1.45 in microfiche. MS thesis, University of Southern Mississippi, August 1970. 38 p, 11 fig, 2 tab, 40 ref. NOAA, NMFS 2-25-R.

Descriptors: *Estuaries, *Fisheries, *Sounds, *Mathematical models, Environmental effects, Salinity, Temperature, Fish management, Mississippi, *Fish migration, Trout, Oxygen, Phosphates, Estuarine fisheries, Coasts.
Identifiers: *Mississippi Sound, *Cynoscion arenarius, Trash fish, White trout.

The non-random distribution of C. arenarius in Mississippi Sound confounds attempts at prediction using data collected from randomly assigned fixed stations. The occurrence of white trout is highly correlated with the density of the surrounding water as well as the rate of change in density. This is probably because of the osmotic mechanism that controls the concentration of the blood as well as the maintenance of internal water. Salinities in Mississippi Sound are within the tolerable range of the species throughout the year. Temperature as stated by Gunter (1945) is evidently the triggering factor to the migratory behavior of C. arenarius from the shallow Gulf into Mississippi Sound. The preference of white trout for certain bottom types probably because of the availability of food, is not unknown to local sport and commercial fishermen. Availability of food, current speeds, wind direction and force, pH and tide are additional factors that should be considered in reducing the amount of unexplained variation in improving the model to predict the occurrence of C. arenarius. (Sinha-OEIS)
W74-02640

DESIGN CONSIDERATIONS FOR A 3-D LASER DOPPLER VELOCIMETER FOR STUDYING GRAVITY WAVES IN SHALLOW WATER,
Army Coastal Engineering Research Center, Washington, D.C.
R. J. Hallermeier.
Applied Optics, Vol 12, No 2, p 294-300, February 1973. 5 fig, 27 ref.

Descriptors: *Gravity waves, *Waves (Water), *Shallow water, *Instrumentation.
Identifiers: *Laser Doppler velocimeter, Optics, Light scattering, Velocimeters, Fluid velocity.

A laser velocimeter system using three frequency-modulated light beams and one detector for measurement of the instantaneous velocity vector in reversing flow is considered. An analysis of the scattering and detection processes by means of the Mie and optical mixing theories is outlined. A system proposed for gravity wave studies uses an argon-ion laser and three Bragg cells as a source and a photomultiplier detector of the light backscattered from 0.2-micrometer-diameter spheres, introduced into the flow in a low concentration, and can measure local velocity vectors of magnitude between 0.1 m/sec and 3.0 m/sec, with turbulent fluctuations of 1% or greater intensity. (Sinha-OEIS)
W74-02642

INSECT PEST MANAGEMENT IN COASTAL AND ESTUARINE HABITATS,
North Carolina State Univ., Raleigh. Dept. of Entomology.
For primary bibliographic entry see Field 05G.
W74-02643

AN ANNOTATED BIBLIOGRAPHY OF AERIAL REMOTE SENSING IN COASTAL ENGINEERING,
Clemson Univ., S.C. Dept. of Civil Engineering.
D. B. Stafford, R. O. Bruno, and H. M. Goldstein.
Army Coastal Engineering Research Center, Miscellaneous Paper No. 2-73, May 1973. 122 p, 1 tab, 200 ref.

Descriptors: *Coastal engineering, *Remote sensing, Bibliographies, Abstracts, *Aerial photography, Satellites (Artificial), *Coasts, *Beaches, Ecology, *Estuaries.
Identifiers: *Remote sensors, *Nearshore processes.

This bibliography covers representative literature on the applications of aerial remote sensing techniques to coastal engineering. About 200 references published since 1934 are presented. Annotations accompany each bibliographic entry and are a concise and informative summary of the references describing the characteristics of each remote sensor in coastal engineering investigations. Computer indexes of authors, titles, and keywords are included. (Sinha-OEIS)
W74-02646

BULLETIN AND SUMMARY OF RESEARCH PROGRESS FISCAL YEARS 1970-71.
Army Coastal Engineering Research Center, Washington, D.C.

Bulletin IV, March 1973. 48 p.

Descriptors: *Coasts, Shores, *Waves (Water), Surges, *Estuaries, Ecology, *Shore protection, *Coastal engineering, *Sediment transport.
Identifiers: Wind waves.

A summary is presented of progress in coastal engineering research at Coastal Engineering Research Center (CERC) for FY's 1970-71. Included are summaries of research and development programs on wind-wave action in coastal waters, shore processes, long-period waves and surges, inlet and estuary dynamics, coastal ecology studies, shore protection, offshore structures, and environmental data collection. Reports are presented on CERC support activities including automatic data processing, and technical and administrative services. CERC publications for FY's 70-71 are listed. (Sinha-OEIS)
W74-02647

RESEARCH PERTINENT TO ENVIRONMENTAL QUALITY CONCERNING THE PERIOD, 1967-1971.
Woods Hole Oceanographic Institution, Mass.

Available from NTIS as PB-210 851, $3.00 in paper copy, $1.45 in microfiche. Technical Report WHOI-72027, May 1972. 60 p.

Descriptors: Pollution abatement, *Coasts, *Bibliographies, Aquatic environment, Estuarine environment, *Water quality, Ecology, *Environmental effects.
Identifiers: Coastal zone, Environmental quality.

The activities of the staff of the Woods Hole Oceanographic Institution in the area of environmental quality for the period 1967-1971 are presented. The first section of the report is a bibliography of papers published during this time; the second section lists the unpublished mimeographed reports, the so-called Blue Cover Reports; and the third section lists other activities such as participation in educational programs, papers presented at scientific meetings, membership on national or international advisory or consultative committees, and congressional testimonies. (Sinha-OEIS)
W74-02648

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

PURIFICATION OF EFFLUENTS BY MEANS OF REVERSE OSMOSIS, (OCHISTKA STOCHNYKH VOD METODOM OBRATNOGO OSMOSA),
For primary bibliographic entry see Field 05D.
W74-02258

ION EXCHANGE AND ALLIED PROCESSES IN WATER RECOVERY,
Permutit Co. Ltd., London (England).
For primary bibliographic entry see Field 05D.
W74-02268

IMPROVING REVERSE OSMOSIS PERFORMANCE WITH DYNAMICALLY FORMED WOOD CHEMICAL MEMBRANES,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 05D.
W74-02286

THE USE OF DESALTED SEAWATER FOR INTENSIVE AGRICULTURAL APPLICATIONS, (EL USO DE AGUA DE MAR DESALADA PARA INTENSIVAS APLICACIONES AGRICOLAS),
Arizona Univ., Tucson. Environmental Research Lab.
C. N. Hodges, and C. Pena.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 39 p, 7 fig, 8 tab, 6 ref.

Descriptors: *Arid lands, Desalination, *Agriculture, Electric powerplants, *Desalination plants, *Saline water, Water supply, Water supply development, Electric power production, Multiple purpose, Regional development, Greenhouses, Growth chambers.
Identifiers: *Mexico (Sonora), Abu Dhabi.

The University of Arizona and the University of Sonora have conducted a cooperative project investigating the desalting of seawater in the arid northwest Mexico. The study began in 1963 in Puerto Penasco, Sonora, Mexico, where originally solar desalination experiments were conducted. Large plastic bubble greenhouses with controlled environments were constructed and cabbages, cucumbers, and other vegetables were cultivated. After completion of the solar energy experiments, the plant was converted to diesel power. In 1969 Abu Dhabi (United Arab Emirates) extended a grant to the University of Arizona to construct a larger power/water/food plant based on the Puerto Penasco plant studies. An Arid Lands Research Center has been established there, and a plant with 48 greenhouses similar to those in Mexico was constructed. Crops like those in Puerto Penasco planted directly into cleaned beach sand came under full production in early 1972,with large yields of fruit and vegetables. The experience with both the Mexican and Arabian installations has been positive, indicating that such multiple-purpose plants have great application in areas where power, water, and high nutrient vegetables are scarce. (Muller-Arizona)
W74-02359

ANOTHER RIO GRANDE FOR NEW MEXICO,
Los Alamos Scientific Lab., N. Mex.
L. P. Reinig, R. I. Brasier, B. J. Donham, and W. S. Gregory.
In: State Water Plan, Proceedings of 18th Annual New Mexico Water Conference, April 5-6, 1973, Las Cruces: New Mexico State University Water Resources Research Institute Report No 026, p 50-61, July 1973. 3 fig, 2 tab, 9 ref.

Descriptors: *Water resources development, *New Mexico, *Groundwater resources, *Desalination, *Nuclear energy, Geothermal studies, Methodology, Costs, Economics, Water supply, Water demand, Mineral industry, Recreation facilities, Water utilization, Saline water, Groundwater, Water quality, Chemical analysis.
Identifiers: Tularosa Valley (N Mex).

Like other southwestern states, New Mexico needs more water. The Upper Rio Grande and Pecos basins have smaller water supplies, in relation to projected demand, than any other basin in the United States. A possible water shortage solution based on desalting, ultimately by means of geothermal or nuclear energy, the several hundred million acre-feet of saline groundwater in the Tularosa Valley is described. The resulting recreational-industrial-agricultural complex would ultimately encompass on the order of one million acres. It would provide one million acre-feet of fresh water per year, 2000 megawatts of electric power, valuable magnesium and other minerals separated from the saline water at a rate of several million tons per year, and many associated recreational and social benefits. The name referred to this enterprise during preliminary conceptual studies is the Tularosa-Rio (TRG) Project. (See also W74-02456) (Woodard-USGS)
W74-02461

MULTI-STAGE FLASH EVAPORATOR,
Societa Italiana Resine S.p.A., Milan (Italy). (Assignee).
D. Barba, G. Liuzzo, and G. Tagliaferri.
U. S. Patent No. 3,763,014, 4 p, 4 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 267, October 2, 1973.

Descriptors: *Patents, *Water treatment, *Desalination, Sea water, *Flash distillation, Condensers, Evporators, *Water quality.

The evaporator comprises an outer, continuous generally horizontally disposed, longitudinally extending casing and an inverted U-shaped shell which is positioned within and extends along the length of the casing. A plurality of vertical, spaced-apart, transverse partition walls having passages therethrough adjacent the bottom of the shell, subdivide the shell into a plurality of serially connected chambers. Inlets and outlets are provided for the continuous flow through the evaporation chambers of the pre-heated liquid (sea-water) to be evporated. Successively lower internal pressure exist in adjacent chambers. The outer walls of the shell and the inner walls of the casing define a number of separate condensation chambers positioned laterally on each side of the central evaporation zone, the condensation chambers extending along the length of the casing. Two heat exchangers, extending along the length of the casing, are positioned within the condensation chambers to cause condensation of the vapor while partially pre-heating the raw sea water. The flow of the raw sea water through the heat exchangers is in a direction opposite that of the flow of the sea water being evaporated in the evaporation chambers. (Sinha-OEIS)
W74-02490

INTERNALLY INTERCONNECTED MULTI--STAGE DISTILLATION SYSTEM,
Hydro Chemical and Mineral Corp., New York. (assignee).
A. Osdor.
U. S. Patent No. 3,755,088, 10 p, 31 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 913, No 4, p 1237, August 1973.

Descriptors: *Patents, *Distillation, *Condensers, *Desalination, Sea water, Multi-stage, *Flash distillation, Water treatment.

Evaporator and condenser arrangements for multistage systems are formed from continuous tabular columns and transverse plates. In the condensers, elongated partition plates cooperate with segments of the column wall todefine internal liquid passageways between spaced condensers. In the evaporators, the transverse plates are shaped to define wells and trap forming partitions. Arrangements are described for achieving imterspersal of condenser groups with minimum pumping and minimum use of column height. (Sinha-OEIS)
W74-02496

3B. Water Yield Improvement

FLOW ANALYSIS OF HYDRAULIC CONNECTORS IN ARTIFICIAL RECHARGE SYSTEMS, A MODEL STUDY,
Ohio State Univ., Columbus. Water Resources Center.
For primary bibliographic entry see Field 04B.
W74-02219

POWER, FRESH WATER, AND FOOD FROM COLD, DEEP SEA WATER,
Polytechnic Inst. of Brooklyn, N.Y.
D. F. Othmer, and O. A. Roels.
Science, Vol 182, No 4108, p 121-125, October 12, 1973. 7 ref.

Descriptors: *Aquifculture, Resources development, *Power marketing, Water resources, *Sea water, Freshwater, Steam, *Solar radiation, Deep water, Economic feasibility, Steam turbines, Solar stills, Marine algae, Marine animals, Lobster, Shrimp, Shellfish, Profit, *Water yield improvement.
Identifiers: *Mariculture, Deep sea farming.

The solar heat energy accumulating in the vast volumes of warm tropical seas is many times that produced by all existing power plants and could yield huge amounts of fresh water and electric power, as the evaporating warm surface water could generate steam to power a turbine and then freshwater upon condensation of steam by the cold water. A 'mariculture' pilot plant built by Alemco Inc. (Division of Viatech Inc., Syosset, N.Y) in the Caribbean indicates a great potential increase in revenues over that from power and freshwater generation. Deep sea water contains large quantities of nutrients to feed algae and, in turn, shellfish, shrimp, and lobster in shallow ponds. Valuable seaweed can be grown on wastes, and substantial profits can be derived by combined revenues from desalination, power generation, and mariculture. (Brown-IPC)
W74-02254

WEATHER MODIFICATION OPERATIONS IN CALIFORNIA, OCTOBER 1, 1970-SEPTEMBER 30, 1971,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
T. A. Johnson, and J. B. Powers.
Available from State of Calif., Documents Section, P.O. Box 20191, Sacramento, Calif. 95820, Price $1.00. Bulletin No 16-71, June 1972. 18 p, 3 plate.

Descriptors: *Weather modification, *Artificial precipitation, *Cloud seeding, *California, Silver iodide, Polyelectrolytes, Surfactants, Fog, Projects, Data collections, Water yield.
Identifiers: Fog dispersion, Airport.

Weather modification operations were conducted in 10 areas of California during the 1970-71 water year by nine licensed operators. Two of these projects were operated to suppress fog: the active agents in one case were polyelectrolytes and surfactants and, in another, urea powder was dispersed. The remaining projects used silver iodide in various forms as the active agent to increase precipitation. Three projects reported in previous years were inoperative during the 1970-71 water year. The Santa Clara County Flood Control and Water District project was inactive for its second season. The Lake Almanor Project of the Pacific Gas and Electric Company, which functioned during the preceding season, was also inactive. Definite plans exist to reactivate both projects in the 1971-72 water year. The Upper Santa Ana River Project of the San Bernardino Valley Municipal Water District was active during the 1970-71 water year but no seeding occurred. Fog suppression experiments were performed at Arcata, California, by the U. S. Naval Weapons Center of China Lake, California, and the U. S. Air Force at McClellan Air Force Base, California. These two activities are described separtely from those performed by licensed operators. (Woodard-USGS)
W74-02293

INTERBASIN TRANSFER OR MIGRATION: AN ECONOMIC ANALYSIS OF TWO RESPONSES TO GROUND WATER DEPLETION,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 04B.
W74-02323

A WAY TO MAKE THE DESERT GREEN,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
G. C. A. Morin, D. K. Parsons, W. G. Matlock, and D. D. Fangmeier.
Progressive Agriculture in Arizona, Vol 25, No 4, p 4-8. July-August 1973.

Descriptors: *Water harvesting, Rainfall-runoff relationships, Computer models, *Crop production, Runoff, *Arizona, Demonstration farms,

Arid lands, Soil moisture, Field crops, *Water yield improvement.
Identifiers: *Desert strip farming.

Collection of local rainfall as runoff for use on nearby cropped areas offers an alternative and little used means of meeting a crop's water requirements in arid and semiarid regions where water is the limiting factor. Desert strip farming, using water harvested from a collector area to help supply the moisture requirements of a cultivated crop on a smaller farmed area, is a technique used centuries ago not only in the Middle East but also in Arizona and northern Mexico. Now modern-day researchers are developing computer models to consider various water sources and losses, and soil and crop characteristics to calculate yield. Data for several stations in the Tucson, Arizona area confirm the validity of the model in varying degrees of conclusiveness. Results from field tests indicate that having good soil moisture conditions as crops germinate is an important factor in the production of a successful crop. Regardless of the collector-area to farmed-area ratio, the yield will be highly variable from year to year and crop failures will occur in certain years because of poor rainfall distribution. While useful as a supplementary cource, such a system is not a total substitute for irrigated agriculture. (Paylore-Arizona)
W74-02346

EVOLVING WATER POLICY AND MANAGEMENT IN THE UNITED STATES,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-02358

ANOTHER RIO GRANDE FOR NEW MEXICO,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 03A.
W74-02461

PROPOSED WATER-RESOURCES AND LAND--CAPABILITY INVESTIGATION, ARUSHA REGION, TANZANIA,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 02A.
W74-02627

EVAPOTRANSPIRATION AND WATERSHED RESEARCH AS RELATED TO RIPARIAN AND PHREATOPHYTE MANAGEMENT--AN ABSTRACT BIBLIOGRAPHY.
Forest Service (USDA), Tempe, Ariz. Forest Hydrology Lab.
For primary bibliographic entry see Field 02D.
W74-02630

3C. Use of Water of Impaired Quality

FACTORS AFFECTING THE MANGANESE STATUS IN SOILS OF THE U.A.R.,
Ain Shams Univ., Cairo (Egypt). Dept. of Soils.
For primary bibliographic entry see Field 02G.
W74-02200

THE USE OF DESALTED SEAWATER FOR INTENSIVE AGRICULTURAL APPLICATIONS, (EL USO DE AGUA DE MAR DESALADA PARA INTENSIVAS APLICACIONES AGRICOLAS),
Arizona Univ., Tucson. Environmental Research Lab.
For primary bibliographic entry see Field 03A.
W74-02359

3D. Conservation in Domestic and Municipal Use

URBAN STORM DRAINAGE ACTIVITIES IN NEW YORK,
Soil Conservation Service, Albany, N.Y.
For primary bibliographic entry see Field 04A.
W74-02171

WATER AND SEWERAGE IMPROVEMENTS NEEDED IN 1975 IN CHATHAM COUNTY, GEORGIA.
Chatham County-Savannah Metropolitan Planning Commission, Savannah, Ga.
For primary bibliographic entry see Field 05D.
W74-02186

MUNICIPAL WATER PLANNING--MIXED INTEGER APPROACH,
Utah State Univ., Logan. Dept. of Civil Engineering.
T. C. Hughes, and C. G. Clyde.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY11, Proceedings paper No. 10131, p 2079-2095, November 1973. 2 fig, 9 tab, 14 ref, 3 append.

Descriptors: *Water distribution, *Water supply, *Alternative planning, *Computer programs, Hydraulics, *Municipal water, Optimization, Costs, Estimating, Water demand, Operating costs, Capital, Investment, Streamflow, Resource allocation, Constraints, Seasonal, Equations, Operations research, Mathematical models.
Identifiers: Mixed integer programming, *Cost minimization, Branch Bound concept, Uncertainty, Chance constrained programming.

A typical municipal water supply planning problem is to select a combination of water sources (some with randomly varying yield), physical facilities, and operating rules in order to supply the stochastic demand of several service zones. Each zone probably will have different growth characteristics and each demand will vary seasonally. This type of planning problem requires a finely-scaled model which may have as many decision variables as a multipurpose regional planning problem. Needed is a mathematical programming model capable of handling uncertainty in both supply and demand to optimize the investment in municipal water supply facilities. The mixed integer approach overcomes here many of the limitations of linear programming: it allows separation of capital investment and operating costs for detailed analysis of the least cost of insuring desired level of service. Standards of pipe and equipment require discrete, not continuous, variables. Presented is an optimizing algorithm based on the Branch Bound concept of mixed integer programming which selects the optimum combination of source-facilities from all possible alternatives. A model is developed for an example problem and the optimum solution is given. (Bell-Cornell)
W74-02223

FOURTH ANNUAL REPORT, CITY OF CARBONDALE, ILLINOIS, WATER AND WASTEWATER TREATMENT.
Carbondale Dept. of Public Works, Ill.
For primary bibliographic entry see Field 05D.
W74-02328

CITY OF AUSTIN, TEXAS, STUDY OF WASTEWATER COLLECTION SYSTEM: PHASE I.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02330

METROPOLITAN WATER AND SEWER PLAN, LUBBOCK METROPOLITAN COUNCIL OF GOVERNMENTS.
Hudgins, Thompson, Ball and Associates, Inc., Lubbock, Tex.

Prepared for Lubbock Metropolitan Council of Governments, Lubbock, Texas, February 1969. 34 p, 2 fig, 10 tab. P-209.

Descriptors: *Planning, *Water supply development, *Sewerage, *Metropolitan studies, Sewage treatment, *Texas, Water resources development, Water resources, Forecasting, *Waste water treatment, Water reuse, Water importing, Imported water, Irrigation.
Identifiers: *Lubbock (Texas).

Guidelines are presented for use in evaluating engineering and planning development programs for water and sanitary sewer facilities for the Lubbock Metropolitan Council of Governments. Water supplies will need to be imported because natural precipitation is deficient. Without supplements to irrigation supplies, acreage under irrigation on the High Plains area is expected to decrease from 2.5 million acres in 1964 to 400,000 acres in 2020. Domestic demand for water is expected to increase from a 1970 level of 30 mgd to 81.4 mgd by the year 2000. Sewage flows are expected to increase from about 20 mgd to 62 mgd over the same period. It is recommended that a technical advisory committee be established to govern development of both water supply and sewerage plans, and that regional cooperation among communities be established. Future water rights must be preserved, and additional rights obtained. Secondary or tertiary wastewater treatment should be developed, and wastewater should be reused for irrigation, groundwater recharge or industrial applications. Industrial wastes should be pretreated to be compatible with the municipal sewage treatment plant. Rural areas should be provided with both water and sewers. Because of the high cost of these projects, estimated to cost over $26 million for water and $12 million for sewerage by 1990, it is recommended that all forms of financial assistance be developed. (Poertner)
W74-02331

REGIONAL WASTEWATER FACILITIES STUDY.
Anderson-Nichols and Co., Inc., Concord, N.H.
For primary bibliographic entry see Field 05D.
W74-02338

NORTHEAST GEORGIA AREA WATER AND SEWER SYSTEMS PLAN AND CAPITAL IMPROVEMENT PROGRAM.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.

Prepared for Northeast Georgia Area Planning and Development Commission, Athens, February 1973. 250 p, 16 fig, 11 tab, 5 append. GPA-GA-04-04-1002.

Descriptors: *Comprehensive planning, *Water supply, *Sewerage, *Regional development, Sewers, Water supply development, Data collections, Financing, *Georgia, Optimum development plans, Financial feasibility, Forecasting.

A comprehensive water and sewer plan was developed for the 10-county Northeast Georgia Area Planning and Development Commission. Located east of the City of Atlanta, this region is generally rural in nature and has had a population decline between 1930 and 1960. However, area population is now increasing, partially due to spinoffs from urban areas. The area includes about 3,000 square miles, and it had a 1970 population of 192,941. The population in the year 2,000 is expected to be about 306,000. Health hazards exist due to a lack of adequate water and sewer facilities. Many residents do not have public water on

sewerage services. Although existing water treatment facilities are maintained in better shape than the sewerage systems, many water systems are marginally operated. Large quantities of water are wasted through leakage. It was recommended that each county establish a county water and sewer authority, and that local water systems be encouraged to join its county authority. Intermim facilities are recommended for those areas where lack of sufficient developments prevents economical connection to the county system. Public education programs to obtain cooperation and connection to the water and sewer systems are recommended, because many residents presently prefer not to join existing systems. Financial and program implementation information is also provided. (Poertner)
W74-02339

WATER QUALITY CHARACTERISTICS OF STORM SEWER DISCHARGES AND COMBINED SEWER OVERFLOWS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 05B.
W74-02345

A STUDY OF WATER USED ON URBAN LANDSCAPES,
New Mexico State Univ., University Park. Dept. of Horticulture.
For primary bibliographic entry see Field 06B.
W74-02459

GROUND-WATER RECHARGE FOR URBAN USE: LEAKY ACRES PROJECT,
Agricultural Research Service, Fresno, Calif. Ground Water Recharge Field Station.
For primary bibliographic entry see Field 04B.
W74-02468

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE HOUSTON, TEXAS METROPOLITAN AREA, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02E.
W74-02471

3E. Conservation in Industry

OPTIMIZATION OF INDUSTRIAL SYSTEMS WITH THE SEPARABLE PROGRAMMING AND THE GENERALIZED REDUCED GRADIENT METHODS,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 05G.
W74-02213

MANUFACTURE OF CAPACITOR PAPER -- SOME PROBLEMS WITH FRESH WATER PREPARATION, (ERZEUGUNG VON KONDENSATORPAPIER -- EINIGE PROBLEME BEI DER FRISCHWASSERHERSTELLUNG),
For primary bibliographic entry see Field 05D.
W74-02247

POWER, FRESH WATER, AND FOOD FROM COLD, DEEP SEA WATER,
Polytechnic Inst. of Brooklyn, N.Y.
For primary bibliographic entry see Field 03B.
W74-02254

HYLTE BRUK: NEWSPRINT AND ENVIRONMENTAL PROTECTION, (HYLTE BRUK: ZEITUNGSDRUCKPAPIER AND UMWELTSCHULTZ).
For primary bibliographic entry see Field 05D.
W74-02256

(TAPPI) ENVIRONMENTAL CONFERENCE, MAY 14-16, 1973.
Technical Association of the Pulp and Paper Industry, Atlanta, Ga.
For primary bibliographic entry see Field 05D.
W74-02273

THE CPAR PROGRAM - GOVERNMENT-INDUSTRY COOPERATION IN POLLUTION ABATEMENT RESEARCH,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 05D.
W74-02274

ADVANCED PRACTICAL WATER RECYCLE IN TISSUE MANUFACTURE,
Kimberly-Clark Corp., Neenah, Wis.
For primary bibliographic entry see Field 05D.
W74-02279

ADVANCED TREATMENT OF PURIFIED SEWAGE FOR PRODUCTION OF HIGH--BRIGHTNESS PULP AND PAPER,
South African Pulp and Paper Industries Ltd., Springs. Enstra Mill.
For primary bibliographic entry see Field 05D.
W74-02280

COMPUTER SIMULATION OF STORM WATER RUNOFF,
Northwestern Univ., Evanston, Ill. Technological Inst.
For primary bibliographic entry see Field 02E.
W74-02310

SURVEY OF METHODS OF TREATING WINE AND GRAPE WASTE WATER,
New York State Dept. of Environmental Conservation, Albany. Environmental Quality Research and Development Unit.
For primary bibliographic entry see Field 05D.
W74-02329

CHARACTERIZATION OF WASTE EFFLUENTS FROM A COMMERCIAL PIMENTO CANNING OPERATION,
Georgia Experiment Station, Experiment.
For primary bibliographic entry see Field 05A.
W74-02379

'CLEAN ENERGY VIA COAL GASIFICATION',
Fluor Corp. Ltd., Los Angeles, Calif.
For primary bibliographic entry see Field 06B.
W74-02462

3F. Conservation in Agriculture

A STUDY OF FACTORS INFLUENCING THE NITROGEN AND PHOSPHORUS CONTENTS OF NEBRASKA WATERS,
Nebraska Univ., Lincoln. Dept. of Agronomy.
For primary bibliographic entry see Field 05B.
W74-02151

MINIMIZING NITRATE SEEPAGE FROM THE HULA VALLEY INTO LAKE KINNERET (SEA OF GALILEE): 1. ENHANCEMENT OF NITRATE REDUCTION BY SPRINKLING AND FLOODING,
Technion-Israel Inst. of Tech., Haifa. Soils and Fertilizers Lab.
For primary bibliographic entry see Field 05B.
W74-02153

PLANT NUTRIENT CONCENTRATIONS IN RUNOFF FROM FERTILIZED CULTIVATED EROSION PLOTS AND PRAIRIE IN EASTERN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Soils.
For primary bibliographic entry see Field 05B.
W74-02154

TWO ENVIRONMENTAL ANALYSES INVOLVING AGRICULTURE,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 05B.
W74-02166

DEVELOPMENT OF AN 'OPERATIONS' MODEL FOR MONTANA'S WATER RESOURCES: MIDDLE CREEK RESERVOIR OPERATION,
Montana State Univ., Bozeman. Water Resources Research Center.
For primary bibliographic entry see Field 04A.
W74-02214

FINANCING PRIVATE WATER RESOURCE DEVELOPMENT: ANALYSIS OF A STATE LOAN PROGRAM,
Wyoming Univ., Laramie. Div. of Agricultural Economics.
T. L. Dobbs, C. E. Olson, W. G. Wedemeyer, and G. H. Pfeiffer.
Available from the National Technical Information Service as PB-226 112, $2.75 in paper copy, $1.45 in microfiche. Research Report, 1972. 18 p, 4 fig, 2 tab, 10 ref. OWRR A-001-WYO (58), OWRR A-002-WYO (4).

Descriptors: *Water resources development, *Financing, *Loans, *State governments, *Wyoming, Sprinkler irrigation, Interest, Investment, Crops, Return (Monetary), Economic impact.

A marked decline in large scale Federally financed irrigation projects in such western states as Wyoming has led to investigation of alternative means of financing such projects through existing financial institutions and private investment. An economic analysis of the Wyoming State low-interest water development loan program for financing center-pivot sprinkler systems and groundwater development is presented. A feasibility analysis alternative means of financing the investments illustrates that the loan program was more attractive to investors than other alternatives and has stimulated the conversion of land from dry pasture and cropland to irrigated forage production. Whereas the state program accounts for the profitability of some forage production plans, sprinkler investments in sugar beets and potatoes are shown as highly profitable even under conventional financing. Simulation analysis indicates a significantly positive impact of sprinkler systems used for cash crops on economic viability of farm firms while those used for forage had less positive and sometimes a negative impact. Because a proportion of sprinkler investments were not dependent on the loan program the precise effects of sprinkler investments on regional development are difficult to ascertain although they are known to be positive. (Weaver-Wisconsin)
W74-02221

GRASSHOPPERS AND CRICKETS IN THE KARSHI STEPPE, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Zoologii i Parazitologii.
R. A. Alimdzhanov, and N. Ergashev.
Uzb Biol Zh. Vol 16, No 2, p 43-45. 1972.
Identifiers: *Alfalfa, Bothriophlax-Semenovi, Conocephalus-Fuscuc, *Cotton, *Crickets, Decticus-Albifrons, *Grasshoppers, Gryllodinus-Kerlensis, Gryllotalpa spp, Gryllus spp, Oecanthus-Turanicus, Platycleis-Intermedia, Pteronemobius spp, Semenoviana-Pltnicovi,

Steppes, Tetigonia-Viridissima, *USSR (Karshi steppe).

The 5 spp. of grasshoppers found in this area in the USSR, Tettigonia viridissima L., Decticus albifrons F., Platycleis intermedia Serv., Sememoviana pltnicovi Uv., and Conocephalus fuscus F., are potentially harmful insects to many field cultures, especially cotton and alfalfa. Three species of Grillidae, Gryllus desertus Pall., G. bimaculatus Deg., and G. burdigalensis Latr. are the most abundant crickets. Also widely distributed are G. pallipalpis (Tarb.), G. chivensis (Tarb.) Gryllodinus kerkennensis Fin., Pteronemobius heideni concolor Walk., P. gracilis Jak., and Bothriophlax semenovi (Mir.). The stalk cricket Oecanthus turanicus Uv. attacks technical cultures. The 2 mole crickets, Gryllotalpa unispina Sauss. and G. gryllotalpa L. live in moist areas. Cultivation and irrigation of the Karshi steppe, USSR, has promoted the increase of crickets, especially of the Gryllus L. and Gryllotalpa L. genera.--Copyright 1973, Biological Abstracts, Inc.
W74-02239

ANHYDROUS AMMONIA FOR FIELD CROPS: AN EVALUATION OF ANHYDROUS AMMONIA AS A NITROGEN SUPPLY FOR COTTON, CORN, RICE AND WHEAT,
M. T. Eid.
General Organization for Agricultural Crops Equilization Fund: Cairo, Egypt. 1972. 257 p. Illus.
Identifiers: *Ammonia (Anhydrous), Books, Corn, Cotton, *Fertilizers, *Field crops, Nitrogen, Nutrition, Rice, Soil Wheat, Hydrogen ion concentration, Egypt.

The feasibility of the use of anhydrous ammonia as a N supply for cotton, corn, rice and wheat in Egypt is discussed. Factors affecting changes of ammonium hydroxide applied to a clay loam soil, changes in soil pH as a result of ammonia application, N absorption by wheat and corn crops when supplied by ammonium nitrate and anhydrous ammonia injected in irrigation water are examined. Field experiments to evaluate anhydrous ammonia as a N fertilizer included in irrigation water, or applied directly to the soil, are described.--Copyright 1973, Biological Abstracts, Inc.
W74-02240

THE ACTION OF ABSCISIC ACID ON ION UPTAKE AND WATER FLOW IN PLANT ROOTS,
Sydney Univ. (Australia). School of Biological Sciences.
W. J. Cram, and M. G. IPitman.
Aust J Biol Sci. Vol 25, No 6, p 1125-1132. 1972, Illus.
Identifiers: *Abscisic acid, *Barley, *Ion uptake (Plants) *Maize, *Roots, Water flow.

Abscisic acid (ABA) inhibited transport of K+ and Cl- from the cut ends of excised barley and maize roots. Transport to the shoot of intact barley seedlings was also inhibited. Total uptake into the excised root of barley did not appear to be affected by ABA. There was an increase in tracer accumulated in the root accompanying the reduction in transport from the cut end. Concentrations of ABA above 10-6 M produced the maximum effect. Measurements of exudation from excised maize roots showed that ABA inhibited both water flow and net K transport into the exudate. The reduction in water flow was completely accounted for as an osmotic consequence of inhibition of K secretion, so that there was no evidence for an effect of ABA on the permeability of the root to water. The results are discussed in relation to the regulation of ion and water distribution within the whole plant.--Copyright 1973, Biological Abstracts, Inc.
W74-02260

DRY ACTIVATED SLUDGE AS FERTILIZER FOR WINTER WHEAT AND CORN, (SUKHOI AKTIVNYI IL KAK UDOBRENIE DLYA POSEVOV OZIMI PSHENITS' I KUKURUZ'),
For primary bibliographic entry see Field 05D.
W74-02270

SYSTEMS ANALYSIS OF IRRIGATION WATER MANAGEMENT IN EASTERN IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 04B.
W74-02322

EFFECT OF EXCESS SOIL MOISTURE ON YIELD AND BIOCHEMICAL PROCESSES IN SPRING WHEAT AT VARIOUS STAGES OF ITS DEVELOPMENT (IN RUSSIAN),
Moscow State Univ. (USSR).
E. V. Ganyushina, and V. M. Lazarchik.
Vestn Mosk Univ Ser 6 Biol Pochvoved, Vol 26, No 5, p 118-120, 1971.
Identifiers: Biochemical processes, *Soil moisture, *Wheat yield, USSR.

Krasnozernaya spring wheat was least resistant to excess soil moisture at the 3-leaf stage and most resistant in the tillering stage.--Copyright 1973, Biological Abstracts, Inc.
W74-02325

A WAY TO MAKE THE DESERT GREEN,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 03B.
W74-02346

TRICKLE IRRIGATION ON COTTON,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
D. A. Bucks, L. J. Erie, and O. F. French.
Progressive Agriculture in Arizona, Vol 25, No 4, p 13-16. July-August 1973, 1 fig, 3 tab, 6 ref.

Descriptors: *Irrigation systems, *Cotton, *Crop response, *Irrigation effects, *Arizona, Experimental farms, Furrow irrigation, Water requirements, Monitoring, Rates of application.
Identifiers: *Trickle irrigation.

The objective of this field investigation on cotton was to evaluate the effects of limiting quantities and varying frequencies of trickle irrigation for maximum crop production. Cotton was chosen because it is a crop which is an excellent indicator of moisture stress. One year's data was gathered and analyzed from the University of Arizona's Cotton Research Center in Phoenix, on a relatively fine-textured clay loam soil with a previous field history of barley for one year and cotton for three years previous to barley. Total fertilizer applied during the previous year and before planting was 420 lb/acre of urea, none thereafter. Criteria for trickle irrigation consisted of applying three quantitites, based on ratios of the plant's consumptive-use estimate, at three frequencies. These nine treatment combinations were replicated four times in a split-plot design. Results suggest that the amount of soil moisture needed by the cotton plant for high production with trickle irrigation is approximately equal to the present consumptive-use estmate for furrow irrigation, and that increased frequency of trickle irrigation may not necessarily increase yields on fine-textured soil. (Paylore-Arizona)
W74-02347

GUIDE TO IMPROVEMENT OF ARIZONA RANGELAND.
Arizona Interagency Range Technical Sub-Committee, Tucson.
For primary bibliographic entry see Field 04A.
W74-02349

THE BALANCE OF SURFACE WATER RESOURCES IN THE LOWER MESOPOTAMIAN VALLEY,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 06B.
W74-02350

USE OF SYSTEMS APPROACHES IN PLANNING ISRAEL'S WATER RESOURCES MANAGEMENT,
Tahal Consulting Engineers Ltd. (Tel Aviv, Israel).
For primary bibliographic entry see Field 06A.
W74-02352

AGROCLIMATIC AREAS FOR WHEAT AND BIOCLIMATIC CHARACTERISTICS OF ITS CULTIVARS IN URUGUAY, (IN SPANISH),
Buenos Aires Univ. (Argentina). Faculted de Agronomia y Veterinaria.
J. J. Burgos, and W. C. Corsi.
Minist Ganad Agric Cent Invest Agric 'Alberto Boerger' Bol Tec. 12 p, 1-32. 1971. Illus. (English summary).
Identifiers: *Agro (Climates), *Bioclimates, Cultivars, Humidity, Photoperiod, Temperature, *Uruguay, *Wheat, Climatic data.

With the meteorological data available in Uruguay, the country was divided in areas according to the world wheat agroclimatic types. The country has 3 different areas with the common characteristic of photoperiod of short duration and lack of cold water. The northern part of the country is very humid during heading whereas the rest is humid. The temperature during ripening is warm in the northwest portion of the country and mild in the rest. The validity of the world wheat agroclimatic types in Uruguay was proved. The cultivars studied in the bioclimatic trials in the period 1965-1968 showed that the best adapted to the agroclimatic conditions of Uruguay were the early ripening cultivars of groups I and II and the late ripening cultivars of group II.--Copyright 1973, Biological Abstracts, Inc.
W74-02354

DETERMINATION OF TRACE FLUORINE IN BIOLOGICAL MATERIALS BY PHOTONUCLEAR ACTIVATION ANALYSIS,
National Inst. of Radiological Sciences, Chiba (Japan).
For primary bibliographic entry see Field 05A.
W74-02361

DISSIPATION AND PHYTOTOXICITY OF DICAMBA RESIDUES IN WATER,
Texas A and M Univ., College Station. Dept. of Range Science.
For primary bibliographic entry see Field 05B.
W74-02370

EVALUATION OF THE REGIONAL MULTIPURPOSE ECONOMIC BENEFITS RESULTING FROM A WATER AND RELATED LAND RESOURCE DEVELOPMENT,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W74-02439

LEGAL AND INSTITUTIONAL CONSTRAINTS IN CONSOLIDATING IRRIGATION SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Economics.
G. E. Radosevich.
In: Optimization of Irrigation and Drainage Systems Proceedings, Irrigation and Drainage Specialty Conference, October 6-8, 1971, Lincoln, Nebraska, American Society of Civil Engineers, New York (1971), p 349-372. OWRR B-043-COLO (8).

Descriptors: *Irrigation systems, *Irrigation, *Water law, *Consolidation, Irrigation practices, Irrigation programs, Administrative decisions, Common law, Constitutional law, Judicial decisions, Legislation, Riparian rights, Water policy, Public rights, Arizona, Colorado, Nevada, Utah, Wyoming.

Legal doctrines and organizational arrangements relative to irrigation systems development, water supply and demand pressures and the role they play in irrigation systems consolidation are examined. The study is primarily concerned with the multitude of irrigation companies within a system and their complex interaction in distributing and applying water. The legal development of the right to use water is reviewed. The important point in the water rights picture is that mere possession of a water right may not guarantee any water to the right holder. Consolidation of irrigation companies, however, would bring together water rights of different priorities. The relevant substantive, administrative and procedural law of a number of states is examined. Conclusions are that the physical properties of the consolidation problem present no real threat and that the identified legal constraints are not impregnable. (Reed-Florida)
W74-02533

THE EFFECT OF SOIL MOISTURE UPON THE AVAILABILITY OF POTASSIUM AND ITS INFLUENCE ON THE GROWTH OF YOUNG MAIZE PLANTS (ZEA MAYS L.),
Landwirtschaftliche Forschungsanstalt, Buentehof (West Germany).
K. Mengel, and C. Von Braunschweig.
Soil Sci. Vol 114, No 2, p 142-148. 1972. Illus.
Identifiers: Diffusion, *Maize growth, Nutrients, *Pottassium, *Soil moisture, Zea-Mays.

The effect of soil moisture on the availability of K and its influence on plant growth was studied with young corn plants. The experiments were carried out with a split root technique in which the plants had to take up the K from a soil medium; the other nutrients and water were provided by a nutrient solution. Different water tensions in the soil were maintained. The experiment consisted of 4 pF water holding index treatments and 5 K treatments. The highest yields and the largest quantities of K taken up by the corn shoots were obtained at pF 2. With increasing water tensions (pF 2.4 and 2.7) the yields and the quantities of K uptake declined sharply. The yield level of the various pF treatments increased with an increase of the exchangeable K of the soil. A linear highly significant relationship was obtained between the K diffusion rates and the total K uptake of the plants. The yield depressions, effected by higher water tensions in the soil were due to a reduced K-availability caused by a restricted K diffusion. The diffusion rates depended mainly on the soil moisture and the K level of the soil respectively. Higher K applications counterbalanced the negative influence of higher pF values on the K diffusion to some extent. There was a highly significant linear correlation between the K content of the shoots and the yield.--Copyright 1973, Biological Abstracts, Inc.
W74-02554

PROPOSED WATER-RESOURCES AND LAND--CAPABILITY INVESTIGATION, ARUSHA REGION, TANZANIA,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 02A.
W74-02627

WATER RECYCLING OF SEWAGE EFFLUENT BY IRRIGATION: A FIELD STUDY ON OAHU,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 02B.
W74-02631

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

URBAN STORM DRAINAGE ACTIVITIES IN NEW YORK,
Soil Conservation Service, Albany, N.Y.
R. J. McClimans, and R. S. Jonas.
Paper No. 73-208 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973.

Descriptors: *Urban drainage, Storm runoff, New York, Cities, *Storm drains, *Floods, Urbanization, Urban hydrology.
Identifiers: *New York City.

Urban flooding problems can be solved. Plans must be developed for adequate storm drainage in expanding suburbs. The objective should be to preserve streams and flood plains in as near their natural state as possible while allowing for compatible functional usage. (SCS)
W74-02171

A SUMMARY ANALYSIS OF NINETEEN TESTS OF PROPOSED EVALUATION PROCEDURES ON SELECTED WATER AND LAND RESOURCE PROJECTS.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-02188

APPLICABILITY OF THE INTERCEPTOR WATERWAY CONCEPT TO THE ROOKERY BAY SANCTUARY,
Tropical Bioindustries Development Co., South Miami, Fla.
E. J. Heald, and D. C. Tabe.
Available from the National Technical Information Service as PB-226 115, $2.75 in paper copy, $1.45 in microfiche. Rookery Bay Land Use Studies, Environmental Planning Strategies for the Development of a Mangrove Shoreline, Study No. 6. The Conservation Fundation, Washington, D.C. November 1973. 13 p, 3 fig. OWRR C-4022 (No. 9004) (1)., C-1817 (No. 3170) (1), and C-2201 (No. 3385) (1).

Descriptors: Bays, *Florida, *Land use, Nutrients, Environmental control, Marshes, *Waterways.
Identifiers: *Rookery Bay sanctuary (Fla), *Interceptor waterways.

The possibilities of stringent land use controls in the wetland regions surrounding the Rookery Bay Sanctuary probably reduce the neceesity for, and the applicability of, an Interceptor Waterway as a water management tool. However, the Waterway, intelligently located, can still perform a useful function as a spreader and redistributor of upland runoff into seaward marshes. The grographic area between Naples Bay and McIlvane Bay, west of U.S. 41, is discussed as a water management unit, and possible locations of interceptor waterways are suggested. Consideration is given to the possible environmental impact of nutrient-rich runoff waters on marsh areas if urban development and agricultural interests choose to rely heavily on marshes as biological filters.
W74-02205

INPUT SPECIFICATIONS TO STOCHASTIC DECISION MODELS,
Arizona Univ., Tucson. Dept. of Systems Engineering.
For primary bibliographic entry see Field 02E.
W74-02209

DEVELOPMENT OF AN 'OPERATIONS' MODEL FOR MONTANA'S WATER RESOURCES: MIDDLE CREEK RESERVOIR OPERATION,
Montana State Univ., Bozeman. Water Resources Research Center.
T. T. Williams, and G. V. V. Rao.
Available from the National Technical Information Service as PB-226 119, $3.50 in paper copy, $1.45 in microfiche. Report No. 44, September 1973. 23 p, 6 fig, 4 ref, 6 append. OWRR A-056-MONT (1).

Descriptors: *Reservoir operation, *Water management (Applied), *Mathematical models, Water supply, Irrigation water, Flood control, Snow surveys, Computer models, Linear programming, Dynamic programming, *Montana, Optimization, *Reservoir releases.
Identifiers: *Hyalite reservoir (Mont).

Operational problems at Hyalite Reservoir, Montana were investigated in a one-year pilot study. Hyalite is a single-purpose (irrigation) reservoir which is normally filled from snow runoff in April, May and June, and normally depleted in July, August and September. Flooding on Hyalite Creek is not normally a serious problem. However, some flood control benefits could be realized by utilizing snow survey data obtained by the U.S. Soil Conservation Service. In years of high winter precipitation, spring filling should be delayed so as to insure storage availability at the time of runoff peak. Linear programming and dynamic programming procedures were presented to demonstrate the feasibility of optimizing reservoir releases over a four-season period. As applied to Hyalite Reservoir, the techniques are of limited use, because spring inflows are almost always adequate to completely fill the reservoir. The techniques will be valuable when applied to a larger basin such as the Musselshell, which is under further investigation.
W74-02214

FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA,
Montana Univ., Missoula.
N. K. Michael.
Available from the National Technical Information Service as PB-226 083, $4.25 in paper copy, $1.45 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Report No. 43, October 1973. 46 p, 9 fig, 32 plates, 5 tab, 13 ref, 4 append. OWRR A-064-MONT (1).

Descriptors: *Flood plain zoning, *Frequency analysis, *Photogrammetry, *Mapping, Flood plains, River basin development, *Montana, Hydrograph analysis, Planning.
Identifiers: Flood plain storage, Flood plain mapping, *Bitterroot River (Mont).

Flood hazard maps, delineating 50-year and 100-year flood plain areas, were prepared for an 80-mile reach of the Bitterroot River in Western Montana. Discharge rates corresponding to 50-year and 100-year recurrence frequency were obtained for six stations on the river using graphical methods suggested by the U.S. Geological Survey. River stage was monitored at 15 locations in the reach for a 14-day period during the June 1972 snowmelt runoff season to develop simulated rating curves. The rating curves were extended to encompass 50 and 100 year frequencies by plotting the data on semi-logarithmic paper and visually fitting the points to a straight line. Aerial photographs of the reach were taken on June 1, 1972 when the river was in flood stage but before the snowmelt peak had occurred. The photographs were used in conjunction with the ground control sites to establish flood boundaries corresponding to 50 and 100-year floods. The flood hazard maps thus produced cost an average of $51 per river mile, as compared to $400-1,000 per river mile reported by Wolman

(U.S. Geological Survey, 1972). Although less accurate, the maps developed in this study are believed adequate for most flood plain planning needs. (Williams-Montana)
W74-02215

MUNICIPAL WATER PLANNING--MIXED INTEGER APPROACH,
Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03D.
W74-02223

MAPPING AVERAGE ANNUAL SURFACE WATER RESOURCES OF THE HYDROLOGICAL REGIONS OF NELSON, NEW ZEALAND,
Ministry of Works, Nelson (New Zealand). Water and Soil Div.
For primary bibliographic entry see Field 02E.
W74-02290

FLOOD CONTROL FUNDS -- 1970 REPORT TO THE LEGISLATURE.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 06C.
W74-02292

RIVER REGIMES IN IRAN,
Durham Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 02E.
W74-02298

ELEVATION DEPENDENT MODEL FOR ESTIMATING ANNUAL RUNOFF,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 02A.
W74-02317

STUDIES ON SEEPAGE FROM CANALS WITH PARTIAL LINING,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
K. Subramanya, M. R. Madhav, and G. C. Mishra.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10197, p 2333-2351, December 1973. 11 fig, 6 ref, append.

Descriptors: *Canal linings, *Canal seepage, Water loss, *Seepage, Leakage, Flow nets, Permeability, Porous media.

Seepage from partially lined trapezoidal canals in a homogeneous isotropic porous medium of large depth was studied using inversion of hodographs and the Schwarz-Christoffel transformation. The two cases studied are: (1) seepage from canals whose sides are lined but bottom unlined; and (2) seepage from canals whose bottom is lined but sides unlined. For every side slope of the canal there is a particular aspect ratio at which lining the sides or bottom results in the same reduction of seepage. For canals having an aspect ratio more than this, bottom lining is more effective and for a lesser aspect ratio, side lining will be more effective. For a canal having an aspect ratio of 9 and a side slope of 2.5:1, a 50% reduction in seepage is ensured by sealing the bottom. (Knapp-USGS)
W74-02319

TOMBIGBEE RIVER VALLEY WATER MANAGEMENT DISTRICT, TENTH ANNUAL REPORT.
Tombigbee River Valley Water Management District, Tupelo, Miss.
For primary bibliographic entry see Field 06B.
W74-02332

GUIDE TO IMPROVEMENT OF ARIZONA RANGELAND.
Arizona Interagency Range Technical Sub-Committee, Tucson.

Bulletin A-58, University of Arizona, Cooperative Extension Service and Agricultural Experiment Station, October 1973. 93 p, 3 tab, 9 maps, 26 photos.

Descriptors: *Range management, *Land classification, *Arizona, *Brush control, Arid lands, Deserts, Mesquite, Range grasses, Brushlands, Forage grasses, Grama grasses, Wheat grasses, Grazing, Grasslands, Land management, *Land use, Environmental control, Planting management, Fertilization.

The publication is intended as a guide in the planning and application of proper range use, brush control, range seeding, and range fertilization practices on Arizona rangeland. The major land resource areas and environmental zones of Arizona are delineated and described in accordance with the national classification of the U.S. Department of Agriculture, Soil Conservation Service, in terms of vegetation, topography, soils, elevation, and climate. Proper range use is discussed in terms of grazing extent and forage production. Methods of evaluating proper range use are presented. Brush control practices are presented as mechanical and chemical alternatives. A table is presented with 16 major undesirable shrubs of Arizona and suggested treatments, with time of treatment and informative remarks concerning each. Range seeding practices are presented as lists and descriptions of preparatory and actual seeding procedures. Twenty-seven beneficial forage species recommended for Arizona are described, and environmental and planting conditions explained. For each of the zones, forage species are recommended by elevation and precipitation constraints. A short section is included on range fertilization recommendations for the Arizona environmental zones. An appendix tabulates common and scientific names of species. (Muller-Arizona)
W74-02349

EVOLVING WATER POLICY AND MANAGEMENT IN THE UNITED STATES,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-02358

EVALUATION OF THE REGIONAL MULTIPURPOSE ECONOMIC BENEFITS RESULTING FROM A WATER AND RELATED LAND RESOURCE DEVELOPMENT,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W74-02439

DEVELOPMENT OF MODELS FOR ANALYZING WATER RESOURCES DEVELOPMENT AND USE WITHIN A REGIONAL FRAMEWORK,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 06A.
W74-02455

FLOOD OF JUNE 1972 AT CORNING, NEW YORK,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-02479

HYDROLOGY AND WATER RESOURCES OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-02480

WETLAND FILL-RESTRICTIONS DO NOT CONSTITUTE A COMPENSABLE 'TAKING' WITHIN THE MEANING OF THE FIFTH AMENDMENT,
C. Biunno.
Seton Hall Law Review Vol 4, p 662-282, 1973. 102 ref.

Descriptors: *Land use, *Public rights, *Wetlands, *Wisconsin, Constitutional law, Zoning, Permits, Environmental effects, Landfills, Drainage, Dredging, Natural use, Real property, Eminent domain, Legal aspects.
Identifiers: Shoreland zoning, Police powers.

The subject case (Just v Marinette County, 50 Wis. 2d 7, 201 N.W. 2d 761 (1972)) marks the first time a court has balanced the restrictions on an individual landowner which are implicit in land-use controls against harm to the environment that adversely affects the rights of the public. The county, acting pursuant to a statute granting counties authority for shoreland zoning, required a property owner to secure a conditional use permit for the filling, drainage, or dredging of wetlands. The Supreme Court of Wisconsin held that because of the special characteristics of the wetlands it was not an unreasonable exercise of the police power to prevent harm to public rights by limiting the use of private property to its natural uses. Cases dealing with the fifth amendment requirement of just compensation for the taking of land by the government are reviewed. By confronting the scope of the property owner's right to use his property as he wishes, the court in this case provided a viable and valuable rationale for courts in states where legislation has recently been enacted to protect coastal wetlands and where challenges regarding reasonableness of such regulations will presumably arise. The decision in the case gives the courts an 'environmental' theory to use in deciding when or whether a state should compensate owners for property losses inflicted by environmental land use regulation. (Sears-Florida)
W74-02503

OGUNQUIT SAND DUNE LAND STABILIZATION MEASURE, YORK COUNTY IN MAINE, THRESHOLD TO MAINE RESOURCE CONSERVATION AND DEVELOPMENT PROJECT (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Orono, Maine

Available from the National Technical Information Service as EIS-ME-73-0704 F, $4.00 in paper copy, $1.45 in microfiche. March 1973. 32 p, 1 map, 1 tab, 3 append.

Descriptors: *Maine, *Land management, *Land use, *Land development, *Erosion control, Vegetation establishment, Sand dunes, Sedimentation, Rivers, Sewage treatment, Wildlife habitats, Estuary, Environmental effects.
Identifiers: *York County (Me.), *Environmental Impact Statements, Coastal waters.

A proposed project in York County, Maine if for land stabilization consisting of restoring and stabilizing a twenty eight acre barrier dune through the placement of sand, plantings of vegetation and the installation of erosion and pedistrian control measures. The measure will reduce erosion on the Ogunquit Dune and Beach and also reduce sedimentation into the Ogunquit River, the Rachel Carson Wildlife Refuge, and the Ogunquit Village Sewer District Sanitary Sewage Treatment Plant. Increased stormwave protection will be provided to the sewage treatment plant and some mainland homes. Habitat will be restored and enhanced for a wide variety of shore birds and other wildlife. The shellfishery in the estuary will be maintained and enhanced. Increased employment and business expansion will result directly from project action. Restricted access to twenty eight acres of the dune and complete coverage of parts of the present dune by sand placement are the major effects of the measure. Loosended material will be trans-

ported to the river mouth during construction. Increased traffic, dust, noise, and road maintenance will result from vehicles involved in construction. (Sears-Florida)
W74-02504

SALMON FALLS DIVISION, UPPER SNAKE RIVER PROJECT, IDAHO, PART 11.
For primary bibliographic entry see Field 06E.
W74-02515

RIVER BASIN MONETARY AUTHORIZATIONS--DISASTER RELIEF ACT AMENDMENTS.
For primary bibliographic entry see Field 06E.
W74-02516

FLOOD CONTROL PROJECT MAINTENANCE AND REPAIR--1970 INSPECTION REPORT,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 02E.
W74-02617

WATER RESOURCES OF THE SKOKOMISH INDIAN RESERVATION, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 02G.
W74-02623

4B. Groundwater Management

AGRICULTURAL CHEMICALS IN SURFACE RUNOFF, GROUND WATER, AND SOIL: 1. ENDRIN,
Agricultural Research Service, Baton Rouge, La.
For primary bibliographic entry see Field 05B.
W74-02152

DETERMINATION OF THE MECHANICAL COMPATIBILITY OF POROUS ROCKS WITH WASTE WATER IN ITS SUBSURFACE DISPOSAL,
Ustredni Ustav Geologicky, Brno (Czechoslavakia).
For primary bibliographic entry see Field 05B.
W74-02165

GROUND WATER SEEPAGE PATTERNS TO WELLS FOR UNCONFINED FLOW--PHASE II,
Iowa State Water Resources Research Inst., Ames.
For primary bibliographic entry see Field 02F.
W74-02206

FLOW ANALYSIS OF HYDRAULIC CONNECTORS IN ARTIFICIAL RECHARGE SYSTEMS, A MODEL STUDY,
Ohio State Univ., Columbus. Water Resources Center.
W. A. Pettyjohn.
Available from the National Technical Information Service as PB-226 069, $4.50 in paper copy, $1.45 in microfiche. Project Completion Report No. 336X, July 1973. 119 p, 56 fig, 7 tab, 22 ref. OWRR A-015-OHIO (1). 14-01-0001-1855.

Descriptors: *Artificial recharge, Hydraulics, *Groundwater movement, *Groundwater recharge, Injection wells, Pit recharge, *Hydrologic models, History, Water management (Applied), *North Dakota, Model studies, Recharge wells, Infiltration, Permeability.
Identifiers: *Hydraulic connectors.

Artificial recharge techniques have long been used to augment groundwater supplies and increase the yield of infiltration galleries. A case history of the water-supply situation at Minot, North Dakota, which has long suffered from severe water shortages, indicates the usefulness of artificial recharge. Throughout much of the Minot aquifer, the water level was raised more than 20 feet within six months of artificial recharge operation. The cost of the system (about $193,000) was minute in comparison to an estimates cost of $12 million for a pipeline to the Missouri River. A model study of the movement of a wetting front beneath an artificial recharge site, under both dry and damp conditions, illustrates the profound effect of permeability and stratification on the shape of the front. A model study dealing with the shape of the cone of recharge in the vicinity of a recharge well shows that there is a sharp change in gradient directly under the well. Elsewhere the cone develops a shape that is generally consistent with theoretical studies. Where the cone of recharge crosses a boundary, indicating a change in permeability, the cone is slightly distorted.
W74-02219

FINANCING PRIVATE WATER RESOURCE DEVELOPMENT: ANALYSIS OF A STATE LOAN PROGRAM,
Wyoming Univ., Laramie. Div. of Agricultural Economics.
For primary bibliographic entry see Field 03F.
W74-02221

GEOLOGIC CONTROL OF GROUND WATER MOVEMENT IN A PORTION OF THE DELAWARE PIEDMONT,
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 02F.
W74-02320

SYSTEMS ANALYSIS OF IRRIGATION WATER MANAGEMENT IN EASTERN IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
C. E. Brockway, J. de Sonneville, J. A. Bondurant, and R. U. Worstell.
Available from the National Technical Information Service as PB-226 100, $6.25 in paper copy, $1.45 in microfiche. Completion Report, October 1973. 74 p, 32 fig, 2 tab, 9 ref. OWRR B-018-IDA (1). 14-01-001-3577.

Descriptors: *Groundwater, *Water management (Applied), Surface-Groundwater relationships, Water level fluctuations, Alluvial aquifers, Digital computers, Model studies, *Irrigation water, *Idaho, *Systems analysis, Regional analysis, Alternative water use, Seepage, Diversion, Water table.
Identifiers: *Snake River Fan (Idaho), Groundwater hydrology, Geohydrologic parameter calibration.

A water management study on a 96,000 acre irrigated tract in eastern Idaho was performed to develop techniques for regional water management studies and investigate alternatives for alleviating a high water table problem in the area. A complete water budget including irrigation diversions, system losses and wastes and crop and property damage was determined. A finite difference digital aquifer boundary includes an automated calibration routine to adjust aquifer parameters to fit historical water table elevations. This routine is especially useful on aquifers with limited hydrogeological data. Results indicate that canal seepage and above average irrigation application rates are the main causes of the rise of up to 40 feet in water tables during the irrigation season. Alleviation of the problem could be achieved with a 20% greater reduction in irrigation diversions or by lining of selected reaches of canals.
W74-02322

INTERBASIN TRANSFER OR MIGRATION: AN ECONOMIC ANALYSIS OF TWO RESPONSES TO GROUND WATER DEPLETION,
Kansas Water Resources Research Inst., Manhattan.
R. W. Ruppert, and G. S. Clausen.
Available from the National Technical Information Service as PB-226 066, $3.00 in paper copy, $1.45 in microfiche. Contribution No. 125, 1973. 31 p, 6 ref. OWRR A-039-KAN (1). 14-31-0001-3516.

Descriptors: *Inter-basin transfers, *Model studies, *Withdrawal, Economics, *Groundwater mining, *Kansas, *Migration, Benefits, Irrigation.

An area which depends upon ground water mining for a substantial proportion of its income faces three alternatives as its groundwater becomes depleted: (1) it can develop more water through alternative sources of supply as improved natural recharge, importation and artificial recharge, and waste water reuse; (2) it can transfer water use to less consumptive, higher-yield applications such as high-yield crops or manufacturing processes; (3) it can incur reductions in income and in population because of migration. An economic model which can be used to compare, from society's point of view, the first alternative and the third as responses to ground water depletion was studied. Should an area depleting its groundwater be encouraged to develop interbasin transfer of water or should it be encouraged to promote migration. In order to fully assess the nature of the costs of constructing or of abandoning facilities such as public buildings and roads and private factories or farm houses, a model of just the area would not be adequate. In order to study society's point of view it is necessary to imbed the model of the area within a model that takes into account the economic consequences of migration on the receiving area. Several conceptual models are developed that include migration, interbasin transfer, and ground water depletion. Some of the theoretical implications of the models are interpreted as they relate to the formulation of ground water resource pricing schemes. Some of the implications of the research findings for local ground water management districts are discussed. The research methods being employed to develop projections of water requirements for the state of Kansas are called into question.
W74-02323

A GUIDE TO IMPORTANT CHARACTERISTICS AND VALUES OF FRESHWATER WETLANDS IN THE NORTHEAST.
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.

Available from the National Technical Information Service as PB-226 075, $3.50 in paper copy, $1.45 in microfiche. Publication No. 31, Massachusetts Water Resources Research Center, Amherst, July 1973. 35 p, 2 maps. (editor, J.S. Larson). OWRR B-012-MASS (5). 14-31-0001-3090.

Descriptors: *Wetlands, *Groundwater potential, *Aesthetics, *Wildlife, *Flood control, Economics, Northeast U.S., *Massachusetts, Value.

Identification and review was conducted of specific characteristics of freshwater wetlands which determine their value for groundwater supply, aesthetics, wildlife, flood control and groundwater economics. Appendices include references to surficial geology and groundwater in Massachusetts, a map (1:500,000) of freshwater wetlands in Massachusetts and a map (1:500,000) of the surficial geology of Massachusetts, with specific reference to potential groundwater aquifers.
W74-02324

WATER RESOURCES OF LEE COUNTY, MISSISSIPPI,
Geological Survey, Washington, D.C.
B. E. Wasson, and F. H. Thomson.
Water-Supply Paper 1899-B, Washington, D.C., 1970. 63 p, 19 fig, 9 tab, 26 ref.

Descriptors: *Water resources, *Data collections, *Mississippi, *Groundwater, Water supply, *Water quality, Water resources development, Planning, Water tables, Water management (Applied).
Identifiers: Lee County (Mississippi), Tupelo (Mississippi).

The water resources of Lee County (in northeastern Mississippi) were investigated in a 2-year study by the U. S. Geological Survey. All sources of water were appraised to provide a base of information to local water users and water utilities. Special attention was given to the quality of ground water in the Tupelo area. In this area, municipal and industrial water use has been the greatest and water levels have declined the most, approximately 3 to 5 feet annually. The 1960 population of the County was 40,589, of which 17,221 lived in Tupelo. Tupelo is largely industrialized, while the rest of the County is agricultural land or forested. Yearly temperatures range from about 12F to 100F, with an average temperature of about 63 degrees. Annual precipitation is about 53 inches. Water supplies are adequate to meet foreseeable needs. In the Tupelo area, water demand in 1967 from two aquifers was about 7 mgd and withdrawal could be doubled for sustained yield. Runoff management is also a feasible means of supplying needed water as runoff exceeds 1,000 acre-feet per square mile per year. Artificial recharge of aquifers with surface runoff appears to offer limited possibilities. (Poertner)
W74-02340

USE OF SYSTEMS APPROACHES IN PLANNING ISRAEL'S WATER RESOURCES MANAGEMENT,
Tahal Consulting Engineers Ltd. (Tel Aviv, Israel).
For primary bibliographic entry see Field 06A.
W74-02352

GROUNDWATER EXPLORATION AND PROVISION FROM THE HYDROGEOLOGICAL POINT OF VIEW,
Bundesanstalt fuer Bodenforschung, Hanover (West Germany).
G. Luettig.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 25 p, 51 ref.

Descriptors: Groundwater, *Groundwater availability, Subsurface waters, Aquifer characteristics, *Aquifers, Groundwater recharge, *Groundwater resources, Hydrogeology, Saline water intrusion, Water storage, Water table aquifers, Surface-groundwater relationships, Arid climates, *Arid lands, Waste water disposal, Water pollution sources, Data collections, *Water quality.

The German Federal Geologic Survey has maintained advisory groups 19 arid countries throughout the world, as well as having conducted extensive hydrogeologic work in West Germany itself. Groundwater resources planning in Germany includes setting aside aquifers for future water development. In such regions, forestry and recreation are given priority over activities of greater water demand. The Survey also considers the impact of new procedures dealing with groundwater, such as solid and fluid waste disposal in aquifers, underground storage of oil and other bulk goods, salt water intrusion, disposal of radioactive wastes, and similar activities. From their overseas activities, dealing principally with the assessment and evaluation of groundwater resources in such arid regions as Iran, Jordan, Mauretania, Niger, Saudi Arabia, and in Latin America in Peru and Argentina, the German Survey recommends worldwide research in the inventorying of groundwater reserves and their quality, with a view of making that knowledge more widely known for necessary intelligent and far-seeing water resources development planning. (Muller-Arizona)
W74-02353

WATER QUALITY MANAGEMENT IN GROUNDWATER BASINS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 05B.
W74-02356

USE OF DIGITAL COMPUTER TECHNIQUES IN WATER RESOURCES DATA STORAGE,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
W. G. Matlock.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 19 p, 1 tab, 8 ref.

Descriptors: *Data collections, *Data storage and retrieval, *Hydrologic data, Information retrieval, *Well data, Computer programs, Computers, Documentation, *Arizona, Arid lands, Groundwater resources.

Data resulting from groundwater resources research in parts of Southern Arizona conducted since 1906 have been placed on punched cards and/or magnetic tape for storage, retrieval, and analysis. Included are well information such as annual water level measurements, yield, specific capacity, water quality and well location. Computer programs to print out the data in forms for various uses were developed. A software package was prepared for making contour maps of groundwater levels, water level changes, and other hydrologic variables. Applications of digital computer techniques in data analysis include: determination of the effect of data density on contouring accuracy, modeling groundwater recharge from an ephemeral stream channel, determination of aquifer specific yield and recharge, a finite difference groundwater basin model, and a model of runoff farming systems. Advantages of the digital computer data reduction and analysis system include savings in both time and money, reduced live storage space and fewer errors. Data are much more available to non-project personnel and other agencies. More detailed analysies, including statistical techniques, are now possible. (Muller-Arizona)
W74-02357

THE ROLE OF DEFORMATION IN CHANGING THE RESERVOIR PROPERTIES OF AQUIFERS,
Montana Univ., Missoula. Dept. of Geology.
For primary bibliographic entry see Field 02F.
W74-02446

WATER RESOURCES DEVELOPMENT IN THE MULLICA RIVER BASIN,
College of South Jersey, Camden. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-02450

A CONJUNCTIVE USE SURFACE WATER--GROUND WATER SIMULATOR,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Geoscience.
For primary bibliographic entry see Field 02F.
W74-02452

DISPERSION OF SUBSTANCES FROM WELL RECHARGE OPERATIONS IN AN ANISOTROPIC, HOMOGENEOUS CONFINED AQUIFER,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 02F.
W74-02454

EVALUATION OF NITRATE CONTENT OF GROUND WATER IN HALL COUNTY, NEBRASKA,
Illinois State Environmental Protection Agency, Springfield. Div. of Land Pollution Control.
For primary bibliographic entry see Field 05B.
W74-02465

UNSTEADY DRAWDOWN AT A PARTIALLY PENETRATING WELL IN A TRANSVERSELY ISOTROPIC ARTESIAN AQUIFER,
University Coll. of Engineering, Hyderabad (India). Dept. of Civil Engineering.
D. B. Rao, G. M. Karadi, and R. J. Krizek.
Ground Water, Vol 11, No 6, p 44-49, November-December 1973. 3 fig, 5 ref.

Descriptors: *Drawdown, *Aquifer characteristics, *Artesian aquifers, *Anisotropy, Unsteady flow, Seepage, Aquifer testing, Computer programs, Equations, Permeability.

The effect of aquifer anisotropy on the unsteady drawdown at the face of a partially penetrating well which is pumped at a constant rate was studied analytically. The aquifer is confined between two parallel aquicludes, and its hydraulic conductivity is assumed to be transversely isotropic. Based on a parametric study of the drawdown equation, it is concluded that the variation in drawdown depends on which of the principal permeabilities is held constant, as well as the ratio between them. For constant radial permeability, the rate of increase of drawdown with time is independent of the permeability ratio; furthermore, unless the well penetration is very small, aquifer anisotropy is of little consequence for permeability ratios close to unity. For constant vertical permeability, well penetration has practically no influence on the drawdown for lower permeability ratios. The effect of aquifer anisotropy increases from a negligible value for a fully penetrating well to a maximum for wells which just tap the aquifer. (Knapp-USGS)
W74-02466

GROUND-WATER RECHARGE FOR URBAN USE: LEAKY ACRES PROJECT,
Agricultural Research Service, Fresno, Calif. Ground Water Recharge Field Station.
H. I. Nightingale, and W. C. Bianchi.
Ground Water, Vol 11, No 6, p 36-43, November-December 1973. 7 fig, 4 tab, 11 ref.

Descriptors: *Artificial recharge, *California, *Recharge ponds, Irrigation water, Infiltration, Water management (Applied), Alluvium, Municipal water.
Identifiers: San Joaquin Valley (Calif), Fresno (Calif).

Problems associated with the use of agricultural surface water for artificial groundwater recharge to maintain an urban groundwater supply are studied at the Leaky Acres Recharge Project in Fresno, California. Groundwater recharge and agricultural technologies are combined to recharge available irrigation water through agricultural soils of known chemical, geologic, and hydrologic properties. Leaky Acres has 47.4 ha of ponding surface in 10 basins. During 1971 and 1972 recharge seasons not all ow the area was in operation at one time; a total of 17,150,000 cu m of high quality water was recharged. The 1972 average intake rate was 17.5 cm per day. Changes in groundwater

quality related to soil leaching during recharge should result in eventual improvement of the regional groundwater quality. (Knapp-USGS)
W74-02468

SHALLOW GROUND WATER IN THE ZAMIN DAWAR AREA, HELMAND PROVINCE, AFGHANISTAN,
Geological Survey, Washington, D.C.
N. E. McClymonds.
Open-file report, January 1972. 103 p, 21 fig, 14 tab, 7 ref.

Descriptors: *Groundwater resources, *Water wells, *Water yield, *Hydrogeology, *Foreign research, Water utilization, Withdrawal, Water table, Aquifer characteristics, Hydrologic cycle, Streamflow, Surface-groundwater relationships, Precipitation (Atmospheric), Water quality, Hydrologic data, Rainfall-runoff relationships, Water resources development.
Identifiers: *Helmand Province (Afhanistan).

Groundwater conditions are evaluated in the Zamin Dawar area which lies between Kajakai Reservoir and Musa Qala Rud (river) in south-central Afghanistan, about 90 km northeast of Lashkar Gah. The area comprises two mainstream drainage areas: that of Gulmesh Mandeh (ephemeral stream) to the east which includes mostly plains with low hills on the east and north slopes and a high limestone scarp on the west slope; and Baghni Rud to the west which drains a mountainous area to the north and spreads onto a large alluvial fan with distributaries leading both to Helmand Rud to the southeast and Musa Qala Rud to the west. During the investigation in 1971, data showed that the karezes yield a total of about 20,000 ac-ft of water per year. The springs on the plains yield about 3,000 ac-ft and the wells about 300 ac-ft per year. The inventoried springs in Baghni valley yield about 6,500 ac-ft per year, and supply about 70% of the total water used in the valley. The total amount of water used in the Zamin Dawar area in 1971 was about 32,000 ac-ft (40 million cu m). This amount of water was used to irrigate about 10,000 jiribs (approximately 5,000 acres or 2,000 hectares) of cultivated land and served a population of about 40,000 people. (Woodard-USGS)
W74-02472

SELECTED REFERENCES, GROUND-WATER CONTAMINATION, THE UNITED STATES OF AMERICA AND PUERTO RICO.
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 05B.
W74-02482

HYGIENIC CONDITIONS IN THE PROCUREMENT OF DRINKING WATER FROM INDIVIDUAL SOURCES (IN GERMAN),
For primary bibliographic entry see Field 05B.
W74-02547

WATER-RESOURCES APPRAISAL OF FISH LAKE VALLEY, NEVADA AND CALIFORNIA,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 02A.
W74-02616

WATER RESOURCES OF THE BIG SIOUX RIVER VALLEY NEAR SIOUX FALLS, SOUTH DAKOTA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02E.
W74-02619

GROUNDWATER RESOURCES OF VAL VERDE COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02F.
W74-02620

HYDROGEOLOGIC ASPECTS OF A PROPOSED SANITARY LANDFILL NEAR OLD TAMPA BAY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05E.
W74-02628

4C. Effects on Water of Man's Non-Water Activities

AN ECOLOGICAL EVALUATION OF STREAM EUTROPHICATION,
Michigan State Univ., East Lansing. Inst. of Water Research.
For primary bibliographic entry see Field 05C.
W74-02201

THE RELATIONSHIPS BETWEEN LAND USE AND EROSION IN THE CENTRAL NORTH ISLAND, NEW ZEALAND,
Waikato Univ., Hamilton (New Zealand). Dept. of Earth Sciences.
For primary bibliographic entry see Field 04D.
W74-02287

EFFECTS OF HIGHWAY BRIDGE CONSTRUCTION ON A SUBARCTIC STREAM,
L. A. Peterson, and D. Nyquist.
The Northern Engineer, Vol 4, No 2, p 18-20, Winter 1972. 2 fig, 1 tab, 10 ref. OWRR B-017-ALAS (5).

Descriptors: *Environmental effects, *Water quality, *Ecosystems, *Bridge construction, *Alaska, Streambeds, Baseline studies, Correlation analysis, Chemical analysis, Aquatic animals, Aquatic plants, Data collections, Evaluation, Water quality control.
Identifiers: *Goldstream Creek (Alaska).

Effects of construction of roads and highways along and over flowing waters and the subsequent reduction in water quality and disturbance of the associated flora and fauna have been the focal point of much heated debate in the United States. The effects of construction of a highway bridge over Goldstream Creek in central Alaska are discussed. Goldstream Creek in the past has been subjected to extreme environmental damage, both aquatic and terrestrial, due to past gold dredging and placer mining operations. The stream has been rerouted to facilitate the mining operations. The terrestrial vegetation has never recovered; however, the aquatic exosystem seems to have fared better. Young grayling were observed in Goldstream Creek in 1971. Presently, Goldstream Creek does not contain a viable sports fishery. The changes in water quality and bottom organisms between August 1970 and October 1971 are described. (Woodard-USGS)
W74-02295

PRESCRIBED FIRE EFFECTS ON WATER REPELLENCY, INFILTRATION AND RETENTION IN MIXED-CONIFER LITTER, DUFF AND SOIL,
California Univ., Berkeley. School of Forestry and Conservation.
H. H. Biswell, and J. K. Agee.
Available from the National Technical Information Service as PB-226 225 $2.75 in paper copy, $0.45 in microfiche. University of California Water Resources Center Completion Report, Nov. 1973, 5 p. OWRR A-044-CAL and B-151-CAL (2).

Descriptors: *Forest Management, *Erosion Control, *Forest fires, *Sediment control, *Water yield improvement, Forest soils, Water conservation, Watershed management, *California.

Prescribed fires were applied to ponderosa pine-incense-cedar and white fir-giant sequoia ecosystems in the southern Sierra Nevada. Aerial and heavy fuels were not affected, but weight, depth, and water-holding capacity of fine fuels were reduced. Forest floor wettability was altered, and some water repellency was transferred to the soil. Soil physical properties were slightly affected: one index of soil water repellency, the capillary rise index, increased. Another index, the water drop penetration time, was not increased. Bulk density was not affected, and even though per cent carbon slightly decreased, the grams per square meter of carbon was not affected. Water runoff, and to a lesser degree sediment yield, were increased by burning. The increases were most highly correlated to the decrease in the forest floor. A computer model using depth of forest floor as an index of runoff and erosion hazard was developed and showed that prescribed fires could be used in ecosystem management without generating erosion hazards of significance. Professional wildlife managers can use the results to simplify the measurement of fire intensity and fuel loading, and to meet the objectives of burning programs while minimizing erosion hazards. (Snyder-California)
W74-02442

MICROBIAL ND CHEMICAL STUDIES IN A WATERSHED USED FOR MUNICIPAL SUPPLY AND WASTE DISPOSAL,
Montana State Univ., Bozeman. Dept. of Microbiology.
For primary bibliographic entry see Field 05C.
W74-02449

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE HOUSTON, TEXAS METROPOLITAN AREA, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02E.
W74-02471

4D. Watershed Protection

CALIBRATING A WATER YIELD MODEL FOR SMALL UNGAGED WATERSHEDS,
Kentucky Dept. of Natural Resources, Frankfort. Div. of Water.
For primary bibliographic entry see Field 02A.
W74-02172

HURRICANE AGNES FLOODS EAST MAHANTANGO CREEK,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 02E.
W74-02174

THE EX POST MEASUREMENT OF BENEFITS AND COSTS IN SMALL WATERSHED PROJECTS,
Georgia Univ., Athens. Inst. of Natural Resources.
For primary bibliographic entry see Field 06B.
W74-02212

HYDROLOGIC AND WATERSHED MODELING FOR WATERSHED PLANNING,
Soil Conservation Service, Portland, Oreg.
D. E. Woodward.
Transactions of the ASAE, (American Society of Agricultural Engineers), Vol 16, No 3, p 582-584, 1973. 8 ref.

Descriptors: Water resources, *Planning, Hydrology, *Conservation, *Computer programs, *Simulation analysis, *Watersheds (Basins), Constraints, *Optimum development plans, Runoff, Reservoir storage, Structures, Earth dams, Hydrographs, *Mathematical models, Systems analysis.
Identifiers: Peak flow.

For the optimum development of land and water resources, future use of hydrologic simulation models as evaluation tools is a necessity. With the advent of high speed computers, more-highly sophisticated modeling is possible, i.e., the ability to consider greater detail in the standard procedures and a greater number of parameters in solving hydrologic problems. The Soil Conservation Service (SCS) has formulated hydrologic and watershed models for the planning and design of conservation measures. These models and the role various organizations have played int their development are described. The basin simulation model developed under contract with the Desert Research Institute in Reno, capable of simulating the major elements of the annual hydrologic cycle, is discussed in detail. Described also are: the SCS computer model developed to evaluate the effects of proposed structural measures on peak flow; and the SCS structure site analysis (computer) program, developed to proportion earth dams and determine the required quantities for a wide range of conditions (using reservoir storage-discharge data to route inflow hydrographs through a potential reservoir and to proportion the structure according to SCS criteria). (Bell-Cornell)
W74-02224

HYDROLOGIC SIMULATION MODEL OF COLORADO SUBALPINE FOREST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 07B.
W74-02248

THE RELATIONSHIPS BETWEEN LAND USE AND EROSION IN THE CENTRAL NORTH ISLAND, NEW ZEALAND,
Waikato Univ., Hamilton (New Zealand). Dept. of Earth Sciences.
M. J. Selby.
Journal of Hydrology (New Zealand), Vol 11, No 2, p 73-87, 1972. 1 fig, 1 tab, 26 ref.

Descriptors: *Erosion, *Land use, *Erosion control, Grazing, Runoff, Gullies, Gully erosion.
Identifiers: *New Zealand (North Island).

Yellow-brown pumice soils cover a large area of the central North Island of New Zealand. Since land development started in the mid 1930s approximately 4000 sq km have been converted from the native vegetation to exotic forests and pasture. Since about 1959 gully erosion has become more common and widespread. Surface-water runoff is greater from developed land in pasture and less from areas covered by scrub and ungrazed grass vegetation. The major causes of runoff from pastures are very intense rainfall on a soil with low moisture content. Modifications of soil properties, especially compaction caused by animals and vehicles, decrease infiltration and hence promote runoff. Soil particles are easily entrained by running water, but plant roots inhibit this process. Analysis of data from the three experiments indicates that land development should be carried out so that: (a) a close vegetation cover is kept on all soils; (b) channel development is avoided; (c) vulnerable areas such as valley floors and steep valley sides are kept as water absorption areas; (d) animals and vehicles are excluded from water absorption areas to prevent soil compaction; (e) plants with strong and dense root systems are used to protect surface soils. (Knapp-USGS)
W74-02287

THE IMPORTANCE OF SEDIMENT TRANSPORT IN WATER RESOURCES PLANNING,
Arizona Univ., Tucson.
S. Ince.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 12 p.

Descriptors: *Sedimentation, *Geomorphology, *Sediment transport, *Planning, Water supply development, Sediment control, Sediment distribution, Sediment load, Silting, Sediment yield, Geology, Erosion, Running Waters, Drainage, Environment, Projects, Engineering structures.

Erosion, transportation and deposition of sediments is a natural state of the earth's surface. Human interference into this cycle causes discontinuities, and sets into motion a new chain of events sometimes with surprising rapidity and with unexpected geomorphological and economic consequences. The reason for this may at times be lack of precise knowledge, but more often than not it is due to the narrow objectives set for the construction of engineering works. Thus a design aimed at only reducing flood damage, may have geomorphologically and economically harmful effects upstream and downstream. If, however, the planning is on a broad scale and geomorphology is considered as an intregral part of any water resources development scheme, it is possible to foresee and take into account the geomorphological changes that could result, assess their environmental and economical consequences, the suggest measures to prevent a drastic change in geomorphology. The judicious planning of water resource systems aimed at maintaining and improving the geomorphology will require not only greater emphasis on the sediment transport problem, but will result in a broader concept of economic analysis. (Muller-Arizona)
W74-02351

EVALUATION OF SOIL MOISTURE REGIME IN A WATERSHED,
New Brunswick Univ., Fredericton.
For primary bibliographic entry see Field 02G.
W74-02355

PRESCRIBED FIRE EFFECTS ON WATER REPELLENCY, INFILTRATION AND RETENTION IN MIXED-CONIFER LITTER, DUFF AND SOIL,
California Univ., Berkeley. School of Forestry and Conservation.
For primary bibliographic entry see Field 4C.
W74-02442

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE ELM CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 02E.
W74-02477

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR CALAVERAS AND ESCONDIDO CREEKS, SAN ANTONIO RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 02E.
W74-02478

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR GREEN CREEK, BRAZOS RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex. Water Resources Div.
B. B. Hampton.
Open-file report (Texas District), August 1973. 30 p, 2 fig, 3 tab.

Descriptors: *Erosion control, *Flood protection, *Retaining walls, *Hydrologic data, *Texas, Small watersheds, Rainfall-runoff relationships, Basic data collections, Rain gages, Streamflow, Gaging stations, Flow rates, Water yield, Sediment control, Soil conservation, Storm runoff, Watershed management.
Identifiers: *Brazos River basin (Tex), Green Creek (Tex).

The U.S. Soil Conservation Service is actively engaged in the installation of flood- and soil-erosion reducing measures in Texas. Hydrologic investigations of small watersheds were begun by the U.S. Geological Survey in 1951 and are now being made in 12 study areas. This report contains the rainfall, runoff, and storage data collected during the 1971 water year for the 46.1-square-mile area above the stream-gaging station Green Creek near Alexander. There are eight floodwater-retarding structures in the Green Creek study area with a total combined capacity of 7,500 acre-feet below the flood-spillway crests, and they control 22.3 square miles, or approximately 50% of the drainage area above the stream-gaging station. The weighted-mean rainfall over the area during the 1971 water year was 19.97 inches, or 63% of the 1931-60 long-term mean annual rainfall of 31.67 inches. The yearly mean discharge at the stream-gaging station Green Creek near Alexander was 1.13 cfs, compared with the 13-year (1959-71) average of 6.03 cfs. The annual runoff was 818 acre-feet. One storm period (May 28, 1971) was selected for detailed analysis and computation. These computations include a detailed time breakdown of rainfall and discharge. (Woodard-USGS)
W74-02626

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

DETECTION OF POLLUTANTS IN WATER BY RAMAN SPECTROSCOPY,
Brown, Boveri und Cie, A.G., Heidelberg (West Germany).
G. Braunlich, G. Gamer, and M. S. Petty.
Water Research, Vol 7, No 11, p 1643-1647, November 1973. 2 fig, 8 ref.

Descriptors: *Pollutant identification, *Spectroscopy, *Fluorescence, Water pollution, Analytical techniques.
Identifiers: *Raman spectroscopy.

The possibility of monitoring pollutants in water by means of Raman spectroscopy is discussed with special reference to the CH-stretching vibration bands of possible impurities. From theoretical considerations the limits of detection were found to be in the range of 1 to 10 ppm. The perturbations due to fluorescence and turbidity in samples were investigated and methods for reducing their effects are discussed. (Knapp-USGS)
W74-02164

QUICK-TIME INSTRUMENTAL MEASUREMENTS OF WASTEWATER ORGANIC CHARACTERISTICS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
T. Helfgott, and F. L. Hart.
Paper presented at the London Workshop of the International Association on Water Pollution Research on 'Instrumentation, Control and Automation for Wastewater Treatment Systems,', September 17-21, 1973. 16 p, 1 fig, 2 tab, 10 ref.

Descriptors: Instrumentation, *Statistical models, *Measurements, Organic wastes, Waste water (Pollution), *Biochemical oxygen demand, Ammonia, Nitrates, Regression analysis, Treatment

facilities, Domestic wastes, Pollutant identification.
Identifiers: Quick-time, Real-time, *Total oxygen demand, *Total organic carbon, *Total nitrogen.

A rationale for replacing the Biochemical Oxygen Demand either 5-day, ultimate or ultimate carbonaceous by quick-time (real-time) measures of organic pollution is presented. Quick-time measures of organic pollution include Total Oxygen Demand, Total Organic Carbon, Total Nitrogen and ion selective probes for measuring ammonia and nitrates. Four statistical models are presented to illustrate the interrelations that can be made with quick-time measurements. Correlation coefficients for the various regression analyses are presented for the four statistical models. Pitfalls in using correlations include misinterpretation (e.g., BOD cannot measure persistence) and statistical artifact (e.g., using unrelated microbial populations for BOD data). It is suggested that the quick (real-time) measure of pollution replace BOD in the operation of wastewater treatment plants.
W74-02170

SURFACE QUALITY ASSESSMENT OF NATURAL BODIES OF WATER,
Calspan Corp., Buffalo, N.Y.
R. E. Baier.
Proc. 13th Conf. Great Lakes Research, 1970; p 114-127. 7 fig, 36 ref.

Descriptors: Lakes, Oil, Water pollution sources, *Pollutant identification, *New York, *Spectroscopy, Bubbles, *Oil pollution, Instrumentation, Air-water interfaces, Films.
Identifiers: *Lake Chautauqua (N.Y.), *Buffalo River (N.Y.).

Multiple attenuated internal reflection (MAIR) spectroscopy is sensitive to surface films as thin as monolayers transferred from air/water interfaces. Repetitive surface samples have been obtained from natural bodies of water by a simple dip technique with variations in Langmuir-Biodgett transfer mechanisms used to favor single film or multilayer deposition. During the 1969 recreational season on Lake Chautauqua, the method demonstrated such phenomena as weekend 'bursts' of hydrocarbon surface pollutants associated with peak recreational activity, rapid natural 'cleansing' of the Lake surface, recognition of proteinaceous substances as major components of bubbles marking wind streaks in the Lake, and of billowing foam accumulated along the windward shore. Application of the method to the Buffalo River demonstrated trapping of surface oil in the upper river segments, with only minor outflow of oily surface pollutants into Lake Erie.
W74-02181

ORGANIC FILMS ON NATURAL WATERS: THEIR RETRIEVAL, IDENTIFICATION, AND MODES OF ELIMINATION,
Calspan Corp., Buffalo, N.Y.
R. E. Baier.
Journal of Geophysical Research, Vol 77, No 27, p 5062-5075, Sept. 1972. 5 fig, 16 ref.

Descriptors: *Films, *Pollutant identification, Air-water interfaces, Bubbles, *Spectroscopy, *New York, *Oily water, Separation techniques, Water pollution control.
Identifiers: *Bubble-Film-Stripping Mechanism, Organic films, *Lake Chautauqua (N.Y.).

Air-water interfacial films were sampled and subjected to nondestructive analysis by multiply attenuated internal reflection (MAIR) infrared spectroscopy. A field program on Lake Chautauqua in western New York correlated the buildup of oily films over the lake surface with peak boating activity and demonstrated the rapid elimination of such pollutant layers by natural mechanisms. A laboratory program to assess the relative efficiencies of various processes for film degradation included studies of the influence of ultraviolet-visible irradiation, capillary-wave action, bacterial activity, and bubble breaking. Bubble breaking and its concomitant ejection of film fragments into the air was by far the most efficient process, especially when simultaneous irradiation accelerated the formation of polar moieties in the films. Chemical fractionation by this mechanism has also been demonstrated, with the more polar organic components and their associated inorganic elements being stripped from the interface preferentially. Thus, air-sea interfacial films are implicated in sea-to-air material transport and in the chemistry of marine aerosols.
W74-02182

CHEMISTRY OF MARINE NATURAL PRODUCTS,
Hawaii Univ., Honolulu. Dept. of Chemistry.
For primary bibliographic entry see Field 05B.
W74-02189

STRONTIUM, CALCIUM AND THE ISOTOPIC COMPOSITION OF STRONTIUM IN UNDERGROUND WATERS FROM THE SCIOTO RIVER BASIN, OHIO,
Miami Univ., Oxford, Ohio. Dept. of Geology.
For primary bibliographic entry see Field 02F.
W74-02218

USING THE ADSORPTION METHOD ON ACTIVATED CHARCOAL WITH CHLOROFORM EXTRACTION (CCE) FOR EVALUATING WATER POLLUTION BY ORGANIC SUBSTANCES, (IN RUSSIAN),
Permskii Politekhnicheskii Institut (USSR). Dept. of Sanitary Technology.
For primary bibliographic entry see Field 05B.
W74-02232

REDUCTION OF BOD AND PHOSPHATE BY CHEMICAL PRECIPITATION. UTILISATION OF SLUDGE,
Uhde (Friedrich) G.m.b.H., Dortmund (West Germany).
For primary bibliographic entry see Field 05D.
W74-02267

CONCENTRATION OF ENTEROVIRUSES FROM LARGE VOLUMES OF WATER,
Baylor Coll. of Medicine, Houston, Tex. Dept. of Virology and Epidemiology.
For primary bibliographic entry see Field 05F.
W74-02271

MEASURING STRESS IN FISH EXPOSED TO PULP MILL EFFLUENTS,
British Colombia Research Council, Vancouver.
For primary bibliographic entry see Field 05C.
W74-02276

A TECHNIQUE FOR EVALUATING ALGAL GROWTH POTENTIAL IN ILLINOIS SURFACE WATERS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 05C.
W74-02342

USE OF SEPHADEX GEL FOR THE FRACTIONATION OF ORGANIC MATTER IN LAKE WATER, (IN RUSSIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
A. Lindpere, and K. Simm.
Eesti Nsv Tead Akad Toim Biol. Vol 21, No 3, p 242-249. 1972. Illus.
Identifiers: *Fractionation, Lakes, *Organic matter, *Sephadex gel filtration, Weight, *Separation techniques, Elution profiles.

Sephadex gel filtration was used for the fractionation of organic color in the different types of lake water. All water samples were collected in winter, concentrated by freezing at -3C, and fractionated on Sephadex G-25 with distilled water as an eluant. Color absorption measurements were made at 225 m micro. In each case the organic substances were separated into 3 peaks, differing in molecular size. The elution profiles of organic matter for the same types of lake water were similar, and they contained the same components. The elution profiles for the water of different lake types were different. The organic matter of dystrophic lakes contained larger quantities of compounds of large molecular weight than those of oligotrophic and eutrophic lakes.--Copyright 1973, Biological Abstracts, Inc.
W74-02343

SEPARATION AND IDENTIFICATION OF METAL DITHIZONATES BY THIN-LAYER CHROMATOGRAPHY AND ITS APPLICATION IN TOXICOLOGICAL ANALYSIS,
Chemical Examiner's Lab., Agra (India). Toxicology Div.
S. N. Tewari, and N. Bhatt.
Mikrochimica Acta, No 3, p 337-340, 1973. 1 tab, 6 ref.

Descriptors: *Separation techniques, *Pollutant identification, *Heavy metals, Methodology, Solvent extractions, Chemical analysis, Toxins, Lead, Copper, Mercury, Cadmium, Zinc, Manganese, Nickel, Cobalt.
Identifiers: *Thin layer chromatography, Biological materials, *Organic solvents, *Metal dithizonates, Complexation, Toxicology, Metal complexes, Biological samples, Toluene, Xylene, Benzene, Carbon tetrachloride, Chloroform.

A quick and reliable method has been developed for the detection of toxic metals present in autopsy tissues and other biological materials, by complex formation and thin-layer chromatography. The study was restricted to the metal ions which form complexes with dithizone and are extractable at (1) pH 1-4 (i.e. Cu, Hg, Cd) and (2) pH 6-8 (i.e. Pb, Zn, Mn, Ni, Co). The thin-layer chromatographic investigation was carried out on Silica Gel-G plates. Autopsy tissues suspected of containing Cu were treated with a chloroform solution of dithizone with the pH of the medium being maintained between 1 and 4. Four developing agents were tested: carbon tetrachloride: chloroform (10:4), toluene, xylene, and benzene. No spray reagents were required as the spots of the metal complexes on the plates were colored. The R sub f values of the common metal complexes in the 4 solvents and the color of their respective spots on the TLC plates are given. (Holoman-Battelle)
W74-02360

DETERMINATION OF TRACE FLUORINE IN BIOLOGICAL MATERIALS BY PHOTONUCLEAR ACTIVATION ANALYSIS,
National Inst. of Radiological Sciences, Chiba (Japan).
S. Ohno, M. Suzuki, M. Kadota, and M. Yatazawa.
Mikrochimica Acta, No 1, p 61-68, 1973. 3 fig, 3 tab, 16 ref.

Descriptors: *Fluorine, *Soil analysis, *Rice, Separation techniques, Water analysis, Air, Vegetable crops, Radioactivity techniques.
Identifiers: Sample preparation, *Photonuclear activation analysis, *Spinach, Chemical interference, Precision, Recovery, Detection limits, Biological samples.

Spinach leaves and rice were prepared for photonuclear activation analysis of fluorine by freeze drying, pulverizing, evaporating with NaOH, fusing the residue with sodium peroxide, dissolving the fused cake in distilled water, centrifuging, and adjusting the supernatant to pH 6-7.

Powdered soil was prepared by fusing with sodium peroxide and following the procedures used for the plant samples. Sample solutions were then passed through an ion exchange resin (Dowex 1X8 and 50WX8) which was dried and sealed in a polyethylene bag for irradiation. Fluorine-18 was separated by adding a fluorine carrier solution and HCl to the sample, filtering, transferring the filtrate to a separation funnel and extracting with dimethyldichlorosilane in xylene. Activity was then measured on a TMC 100-channel pulse height analyzer and the results compared with those from standard solutions. Recoveries ranged from 85 to 91 percent, the detection limit was about 0.01 microgram, and precision was about plus or minus 11 percent. The extraction procedure apparently eliminated interference from iodine, bromine, and chlorine. The method is applicable to air, water, and other environmental materials in addition to biological and geological materials. (Little-Battelle)
W74-02361

EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF VANADIUM AS A MIXED LIGAND COMPLEX OF OXINE AND AZIDE,
Andhra Univ., Waltair (India). Dept. of Chemistry.
V. P. R. Rao, and Y. Anjaneyulu.
Mikrochimica Acta, No 4, p 481-490, 1973. 7 fig, 23 ref.

Descriptors: *Separation techniques, *Spectrophotometry, *Aqueous solutions, Heavy metals, Absorption, Colorimetry, Color.
Identifiers: *Vanadium, *Complexation, Sensitivity, Complexing agents, Chemical interference, Free energy of formation, Organic solvents, Magnetic moments, Recovery.

Vanadium, oxine and azide react at pH 3.5-4.5 to give a dark green solid which extracts into benzene giving dark green solution. The extract has absorption maxima at 415 nm and 620 nm with molar absorptivities 8650 and 6040 respectively. Spectrophotometric investigations reveal that the extracting species has V, HOx, and N3 (-) in the ratio 1 to 2 to 2. Beer's law is obeyed up to 8.10 micrograms and 10.50 micrograms of vanadium per ml at 415 nm and 620 nm, respectively. The sensitivity of the color reaction is 0.0065 microgram per sq cm at 415 nm and 0.009 microgram per sq cm at 620 nm. The percent extraction of V was found to be 90. The formation constant and the free energy of formation are 8.3 to 8.7 times 10 to the 6th power and -9.91 to -9.31 Cal respectively at 30 C. The interference of various foreign ions was studied and methods are proposed for the elimination of the interference of some of those substances. Infrared and magnetic data of the solid complex are given. (Little-Battelle)
W74-02362

SOME CHEMICAL AND BIOLOGICAL CHARACTERISTICS OF THE MISSISSIPPI RIVER BORDERING IOWA,
Iowa Univ., Iowa City.
For primary bibliographic entry see Field 05B.
W74-02363

PYRIDINE KETOXIMES AS ANALYTICAL REAGENTS: THE SPECTROPHOTOMETRIC DETERMINATION OF COBALT WITH 2--PYRIDYL-2-THIENYL-BETA-KETOXIME,
Windsor Univ. (Ontario). Dept. of Chemistry.
H. R. Notenboom, W. J. Holland, and R. G. Billinghurst.
Mikrochimica Acta, No 3, p 467-473, 1973. 1 fig, 2 tab, 19 ref.

Descriptors: *Spectrophotometry, *Cobalt, *Pollutant identification, *Aqueous solutions, *Chemical analysis, Methodology, Solvent extractions, Hydrogen ion concentration, Time, Chelation, Fluorides, Synthesis, Anions, Cations.
Identifiers: *Chromogenic reagents, 2-Pyridyl-2-thienyl-beta-ketoxime, *Trace levels, Chemical concentration, Ionic interference, Metal chelates, Sample preparation, Precision, Accuracy, Chemical concentration, Pyridine ketoximes, Chemical interference, Organic solvents, Characterization, Hydrochloric acid, Chloroform, Dichloromethane, Methyl isobutyl ketone, Benzene, Hexane, Carbon tetrachloride, Permanganates, Chromates, Disodium EDTA, Palladium, Platinum.

The synthesis and characterization of 2-pyridyl-2-thienyl-beta-ketoxime (I) and its application to the spectrophotometric determination of trace amounts of cobalt by extraction of the resulting chelate from strong hydrochloric acid solution into chloroform are described. Under the conditions of analysis the chelate has a maximum absorbance of 412 nm with a molar absorptivity of 20,000 and a Sandell sensitivity of 0.0029 microgram/sq cm. The optimal pH range for chelate formation was 7.0-10.8; the addition of sufficient HCl to make the sample solution 1.2-3.4 M gave reproducible results. The Co chelate in 3 M HC1 was stable for at least one week and the chloroform extracts for at least 2 hours. As little as 0.5 ml of reagent solution gave reproducible results. The chelate was completely extractable into chloroform and dichloromethane, partially extractable into methyl isobutyl ketone and benzene and non-extractable into hexane and carbon tetrachloride. A large number of ions did not interfere with the analysis; however, permanganate, chromate, disodium EDTA, fluoride, palladium, and platinum (2 and 4 plus) ions seriously interfered and must be absent from all determinations. (Holoman-Battelle)
W74-02364

DISTRIBUTION OF CAESIUM-137 IN BRITISH COASTAL WATERS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 05B.
W74-02365

ANALYTICAL APPLICATIONS OF GAS CHROMATOGRAPHY OF METAL CHELATES,
Birmingham Univ. (England). Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-02366

DETERMINATION OF TRACE AMOUNTS OF CHROMIUM BY ATOMIC ABSORPTION SPECTROMETRY WITH A TANTALUM FILAMENT ATOMIZER,
Nagoya Univ. (Japan). Dept. of Synthetic Chemistry.
For primary bibliographic entry see Field 02K.
W74-02367

EXTRACTION OF BORIC ACID WITH ALIPHATIC 1,3-DIOLS AND OTHER CHELATING AGENTS,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
B. Egneus, and L. Uppstrom.
Analytica Chimica Acta, Vol 66, No 2, p 211-229, September 1973. 12 fig, 9 tab, 23 ref.

Descriptors: *Separation techniques, *Solvent extractions, *Methodology, *Aqueous solutions, Chelation, Boron, Chemical properties, Hydrogen ion concentration, Inorganic compounds, Infrared spectrophotometry, Nuclear magnetic resonance, Pollutant identification.
Identifiers: *Boric acid, *Chelating agents, *Chemical recovery, *Aliphatic 1 3-diols, Infrared spectra, NMR spectra, Ultraviolet spectra, Aliphatic hydrocarbons, Reagents, Organic solvents, Esterification, Ketones, Amines, Sample preparation, Inorganic acids, Ultraviolet spectrophotometry, Phenylethanediol-1 2, Propanediol-1 3, Catechol, 2 2'-Dihydroxybiphenyl, o-Hydroxyacetophenone, 4 4'-Methylene-bis (3-hydroxy-2-naphthoic acid), Benzoylacetone, 1 2-Cyclohexanedione, 2-Pyridylmethylacetate, 2-Pyridineethanol.

Some 40 compounds have been investigated with reference to their boric acid extraction properties. Preliminary tests showed that aliphatic 1,3-diols with at least 6 carbon atoms possess superior extraction qualities compared to diketones, hydroxyketones, hydroxyamines and other species investigated. The 1,3-diols were then further studied with attention to size and steric configuration. The extraction equilibria involved were thoroughly investigated for 2,2-diphenylpropanediol-1,3 (DPPD). The constants derived showed that this diol, in spite of its large hydrophobic groups, has a smaller reaction constant than the previously investigated 2,2-diethylpropanediol-1,3 (DEPD) and 2-ethylhexanediol-1,3 (TMPD), which seems to form a very stable ester with boric acid in chloroform at room temperature. The ester formation is supported by n.m.r. and i.r. spectra. The effect of geminal substituents in the 2-position is discussed. (Holoman-Battelle)
W74-02368

SEASONAL CHANGES IN THE ORGANIC FORMS OF CARBON, NITROGEN AND PHOSPHORUS IN SEA WATER AT EL IN THE ENGLISH CHANNEL DURING 1968,
Southampton Univ. (England). Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-02369

CHLORODIOXINS IN PESTICIDES, SOILS, AND PLANTS,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
For primary bibliographic entry see Field 05B.
W74-02371

SAMPLING TECHNIQUES IN CHROMATOGRAPHY,
Waterloo Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 07B.
W74-02372

COMPLEX BEHAVIOUR OF COBALT IN THE DANUBE RIVER,
Institut za Nuklearne Nauke Boris Kildric, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 05B.
W74-02373

PRINTOUT COLORIMETER FOR AUTOANALYSIS OF WATER POLLUTION,
Upper Tame Main Drainage Authority, Birmingham (England).
X. V. M. Snaddon, S. A. Mayo, and J. Cope.
Process Biochemistry, Vol 8, No 9, p 15-17, September 1973. 3 fig, 3 ref.

Descriptors: *Colorimetry, *Water analysis, *Instrumentation, *Automatic control, Design criteria, Chemical oxygen demand, Ammonia, Nitrites, Electronic equipment, Data processing, Monitoring.

A dual-beam colorimeter was developed to perform routine and continuous monitoring. The criteria for the system were that it be reliable, automatic correction of electronic drift be provided, discrimination between channels be provided with a means of detecting plateaus and peaks and converting these maxima into concentration units, results be displayed in digital form, and sample identification be included with results. The system consists of four basic sections: the input amplifiers, linearizer, and subtractor; and analog to

digital converter and maximum memory system; the digital output stage; and the power supplies. The optical system is designed to withstand dropping without damage. Results of determinations of COD agreed closely with those obtained by other methods. Use of the system to determine ammonia-nitrogen and nitrite revealed that temperature variations and oxidation of reagents affected results. Suggestions are given for coupling alarms, automatic shutoff, and data accumulation systems to the colorimeter. (Little-Battelle)
W74-02374

INTERPRETATION OF INFRARED SPECTA USING PATTERN RECOGNITION TECHNIQUES,
Pennsylvania State Univ., University Park. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-02376

THE FORMATION OF WATER-IN-OIL EMULSIONS SUBSEQUENT TO AN OIL SPILL,
Nova Scotia Technical Coll., Halifax. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05B.
W74-02377

ANALYZING HEAVY ENDS OF CRUDE,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
C. J. Thompson, J. E. Dooley, D. E. Hirsch, and C. C. Ward.
Hydrocarbon Processing, Vol 52, No 9, p 123-130, September 1973. 2 fig, 7 tab, 14 ref.

Descriptors: *Chemical analysis, *Methodology, *Separation techniques, Pollutant identification, Organic compounds, Mass spectromectry, Nuclear magnetic resonance, Distillation, Cation exchange, Anion exchange, Aromatic compounds.
Identifiers: *Crude oil, *Heavy distillates, *Oil characterization, Gach Saran crude oil, Chemical composition, Petroleum distillates, Saturates, Monaromatics, Diaromatics, Polyaromatic-polar compounds, Chemical treatment, Isothermal distillation, Boiling point, Aromatic hydrocarbons, Petroleum hydrocarbons, Gel permeation chromatography, Mass spectra, Silica-alumina gel chromatography, Liquid solid chromatography, Ion exchange resins, Polyaromatics, Gradient elution adsorption chromatography, NMR spectra, Molecular distillation.

A systematic procedure which utilizes isothermal and molecular distillation, chemical treatment, silica-alumina gel chromatography, gel permeation chromatography and spectrometry has been developed for the separation and characterization of heavy ends of petroleum. Some aspects of the procedure are described and applied to a 370-535 C (700-1000 F) distillate from Gach Saran, Iran, crude oil. In this application chromatography is utilized through anion and cation exchange resins to separate acids and bases, followed by chemical treatment with FeC13 to remove neutral nitrogen compounds. The distillate, then essentially free of acids, bases and neutral nitrogen compounds, is passed through a dual silica-alumina gel adsorption column, using gradient elution, to produce four well-defined concentrates; namely, saturates, monoaromatics, diaromatics and polyaromatic-polar compounds. Mass spectra were used to identify the general composition of each concentrate. A combination of gel permeation, mass spectrometric and nuclear magnetic resonance data was then used to further evaluate the adsoprtion concentrates of the distillate. The entire procedure is schematically outlined. (Holoman-Battelle)
W74-02378

CHARACTERIZATION OF WASTE EFFLUENTS FROM A COMMERCIAL PIMENTO CANNING OPERATION,
Georgia Experiment Station, Experiment.
W. A. Bough.
Journal of Milk and Food Technology, Vol 36, No 7, p 371-374, July 1973. 1 fig, 3 tab, 12 ref.

Descriptors: *Effluents, *Flow rates, *Waste identification, Industrial wastes, Food processing industry, Chemical analysis, Sampling, Pollutant identification, Chemical oxygen demand, Biochemical oxygen demand, Acidity, Hydrogen ion concentration, Suspended solids, Waste water (Pollution), Dissolved solids, Fruit crops.
Identifiers: *Pimiento cannery, Characterization, Sample preparation, Composite samples, Volatile solids, Settleable solids, Fixed solids, Total solids.

Composite samples of liquid effluents taken at each unit operation in pimiento processing every 30 min over a 2-hr period were passed through a 20-mesh screen to remove particulate material and analyzed in duplicate for the following characteristics: total, fixed, volatile, suspended, dissolved, and settleable solids; pH; total acidity; COD; and 5-day BOD. Flow rates were determined with a trapezoidal weir which was placed in the rectangular gutters carrying the effluents. Characterization of the unit effluents revealed significant patterns of difference in composition and flow rates. The most concentrated effluent occurred in the first stage of the processing operation where the roasted peel was removed by washing. The suspended solids load of this effluent accounted for 69 percent of the total suspended solids load and 37 percent of the COD load, but only 18 percent of the total flow. Segregation and separate treatment of this concentrated effluent is suggested to reduce the total waste load. Another conentrated effluent resulted from the citric acid dip before the packing and closing area. The flow of the effluent was only 10 percent of the total, but accounted for 32 percent of the total dissolved solids and 37 percent of the total BOD. Two effluents from the grading area accounted for 50 percent of the total flow and only 10 percent of the total COD load. Recycling of these dilute effluents to the peel removal operation is suggested. Based on the rate of processing, the total wastes produced from pimiento canning contained 3.2, 60.2, and 35.4 lb. of suspended solids, COD, and BOD, respectively, per ton of raw pimientos. The total waste flow was 4,840 gal. per ton. (Holoman-Battelle)
W74-02379

PHOTOLYSIS OF PARATHION (O,O-DIETHYL-O- (4-NITROPHENYL) THIOPHOSPHATE). NEW PRODUCTS,
Miami Univ., Oxford, Ohio. Hughes Labs.
For primary bibliographic entry see Field 05B.
W74-02380

PERSISTENCE OF ENDOTHALL IN AQUATIC ENVIRONMENT AS DETERMINED BY GAS--LIQUID CHROMATOGRAPHY,
Syracuse Univ. Research Corp., N.Y. Life Sciences Div.
For primary bibliographic entry see Field 05B.
W74-02381

RATES AND PRODUCTS OF DECOMPOSITION OF 2,2-DIBROMO-3-NITRILOPROPIONAMIDE,
Dow Chemical Co., Midland, Mich. Halogens Research Lab.
For primary bibliographic entry see Field 05B.
W74-02382

PICLORAM PHOTOLYTIC DECOMPOSITION,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 05B.
W74-02383

GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF CHLORFENVINPHOS IN MILK, EGGS, AND BODY TISSUES OF CATTLE AND CHICKENS,
Agricultural Research Service, Kerrville, Tex. Livestock Insects Lab.
M. C. Ivey, D. D. Oehler, and V. H. Claborn.
Journal of Agricultural and Food Chemistry, Vol 21, No 5, p 822-824, September/October 1973. 2 fig, 2 tab, 6 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Organophosphorus pesticides, *Milk, *Poultry, *Cattle, *Pollutant identification, Pesticide residues, Insecticides, Acaricides, Miticides, Solvent extractions, Farm wastes, Methodology, Chemical analysis, *Gas chromatography.
Identifiers: Flame photometric gas chromatography, Animal tissues, Chlorfenvinphos, Chemical recovery, Sample preparation, Cleanup, Detection limits, Sensitivity, Gas liquid chromatography, Eggs, Bioaccumulation, Liver, Heart, Kidneys, Feces, Fat tissue, Muscle.

A reliable and sensitive gas liquid chromatographic method is described in which a flame photometric detector is used to determine micro amounts of chlorfenvinphos in the milk and body tissues of cattle and in the body tissues, eggs, and manure of chickens. With extraction and cleanup, 0.002 ppm of the insecticide could be detected in milk and 0.001 ppm in body tissues and eggs. Recoveries of ъ3-100 percent were obtained from the fat, muscle, kidney, liver, and heart of cattle and from the fat, muscle, liver, skin, and manure of chickens. Recoveries of 93 percent were obtained from milk and 81 percent was obtained from eggs. (Holoman-Battelle)
W74-02384

ANALYSIS OF HIGH-PURITY WATER BY FLAMELESS ATOMIC-ABSORPTION SPECTROSCOPY. PART II. SIGNAL INTEGRATION WITH A NON-RESONANCE LINE CORRECTION SYSTEM FOR SPURIOUS ABSORPTION PHENOMENA,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
C. J. Pickford, and G. Rossi.
Analyst, Vol 98, No 1166, p 329-334, May 1973. 4 fig, 1 tab, 15 ref.

Descriptors: *Chemical analysis, *Heavy metals, *Automatic control, Water analysis, Calibrations, Cobalt, Chromium, Copper, Iron, Manganese, Nickel, Lead, Trace elements, Automation, *Spectrophotometry.
Identifiers: *High purity water, Flameless atomic absorption spectrophotometry, Multielemental analysis, Graphite tube, Precision, Signal integration, Absorbance, Reproducibility.

A polychromator has been used in conjunction with a multi-channel integration system and an automatic sample injection unit in graphite-tube flameless atomic-absorption spectroscopy. The precision of the system has been evaluated at high and low absorbances, and its ability to compensate for spurious absorption and variable volatility effects examined. The use of a non-resonance line correction system and integration of the absorption signal improves the precision of graphite-tube flameless atomic-absorption spectoscopy, particularly at low concentration levels. Some variations in signal intensity caused by changes in the volatility of the sample can be eliminated, and the compensation for spurious absorption phenomena is satisfactory up to 95 percent absorption, provided that the reference line is close to the resonance line of the main element. With the automatic sampler the system does represent a first approach to a fully automatic scheme for multi-element determinations by flameless atomic-absorption spectroscopy. The results achieved indicate the feasibility and the applicability of such a system, particularly when a limited number of elements have to be determined on a routine basis or

when the limited size and the nature of the sample (toxicity and activity) could make cumbersome or impossible the determination of more elements. (Holoman-Battelle)
W74-02385

THE DETERMINATION OF METHYL MERCURY IN URINE,
Environmental Protection Agency, Perrine, Fla. Perrine Primate Lab.
R. T. Ross, and J. G. Gonzalez.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 3, p 187-192, September 1973. 2 fig, 14 ref.

Descriptors: *Urine, *Methodology, *Pollutant identification, Chemical analysis, Solvent extractions.
Identifiers: *Electron capture gas chromatography, *Methylmercury, Sample preparation, Cleanup, Chemical recovery, Cysteine acetate, Acidification, Organic solvents, Organomercury compounds, Body fluids, Biological samples, Methylmercury chloride.

Described is a modification of the procedure for the determination of methyl mercury in urine employing a cysteine acetate cleanup procedure and analysis using the GLC-EC technique. A urine sample is pipetted into a stoppered centrifuge tube and acidified to pH 1 with concentrated HC1. Benzene is added to the mixture and shaken vigorously for 5 min. The emulsion was broken by centrifugation, and the organic layer removed by a disposable pipette. The urine is extracted again as described above. The organic layers were combined, and an aliquot was removed and extracted with cysteine acetate solution. The mixture was shaken vigorously, the layers separated, and an aliquot acidified to pH 1 with HC1 and extracted with two portions of benzene. The benzene layers were combined, dried over anhydrous sodium sulfate and stored in a glass stoppered test tube until GLC analysis. This method is capable of detecting ppb of methyl mercuric chloride (MMC) and combines high recoveries and rapid analysis time in a single procedure. Since binding of MMC to urine constitutents is fast and complete, acidification of the urine to pH 1-2 is absolutely necessary prior to benzene extraction. The cleanup procedure using cysteine acetate solution is also essential for the elimination of interfering GLC peaks. (Holoman-Battelle)
W74-02387

A MODIFIED EXTRACTION METHOD FOR DETERMINATION OF MINERAL OIL IN SEA WATER,
D. R. Hughes, R. S. Belcher, and E. J. O'Brien.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 3, p 170-171, September 1973. 1 tab, 1 ref.

Descriptors: *Water analysis, *Sea water, *Separation techniques, *Oil, Oily water, Solvent extractions, Oil pollution.
Identifiers: *Recovery, *Infrared absorption, Crude oil, Sample preparation, Efficiency, Mineral oil.

Synthetic seawater samples for evaluation of three oil-extraction procedures were prepared by adding sodium chloride to distilled water and spiking with 3.8 to 188 ppm Bass Strait Crude Oil. The three extraction techniques were (1) reciprocal shaking with carbon tetrachloride, (2) stirring with a stainless steel impeller with carbon tetrachloride, and (3) same procedure as (2) in an ultrasonic cleaning bath. Extractions were for 15 minutes, after which samples were allowed to stand overnight. Further separation was carried out in a separatory funnel. The third procedure required centrifuging to separate phases. Extracts were added to a Florisil column, eluted with carbon tetrachloride, and the summed infrared absorption determined for the eluate. Recoveries which were determined from calibration curves were best (mean value 102 percent) using the stirring-ultrasonic dispersion method. (Little-Battelle)
W74-02388

VOLTAMMETRIC IDENTIFICATION OF ORGANOCHLORINE INSECTICIDES, POLYCHLORINATED BIPHENYLS, POLYCHLORINATED NAPHTHALENES AND POLYCHLORINATED BENZENES,
Montana State Univ., Bozeman. Dept. of Chemistry.
S. O. Farwell, F. A. Beland, and R. D. Greer.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 3, p 157-165, September 1973. 2 fig, 4 tab, 8 ref.

Descriptors: *Pollutant identification, *Polychlorinated biphenyls, *Chlorinated hydrocarbon pesticides, Chemical analysis, Pollutants, Organic compounds, Electrochemistry, DDE, Heptachlor, Dieldrin, Aldrin, Insecticides, Methodology, Equipment.
Identifiers: Fingerprinting, *Polychlorinated naphthalenes, Voltammetry, *Voltammetric detector, *Polychlorinated benzenes, Characterization, Chlorinated hydrocarbons, Isomers, Reduction potentials, Biphenyl, Voltammograms, 1 3 5 7-Tetrachloronaphthalene, Hexachlorobenzene, 2 4 5 2' 4' 5'-Hexachlorobiphenyl, Lindane, Chlordene, trans-Chlordane, 2-Chlorobiphenyl, 2 5-Dichlorobiphenyl, 2 6-Dichlorobiphenyl, 2 4 5-Trichlorobiphenyl, 3 4 5-Trichlorobiphenyl, 2 3 5 6-Tetrachlorobiphenyl.

The need for an analytical method which would provide for the exact identification or 'fingerprinting' of chlorinated hydrocarbons in the environment prompted the study of the possibility of using a voltammetric detector. This detector could provide both gross classification, such as distinguishing between polychlorinated biphenyls (PCB) and polychlorinated naphthalenes (PCN), and identification of the specific isomer in each class of compound. This research represents the first in the voltammetric reduction of PCB's and PCN's and provides a preliminary description of the analytical methodology applicable to the rapid identification of these compounds. The apparatus used employed three-electrode potentiostatic control circuitry with interruptable linear voltage sweep control. All solutions were 0.5 mM in the electroactive species with dimethyl sulfoxide as the solvent and 0.1 M tetraethylammonium bromide as the supporting electrolyte. Nitrogen gas was used for deaeration. The voltage values for the compounds analyzed are tabulated. (Holoman-Battelle)
W74-02389

INTERCALIBRATION OF ANALYSES OF RECENTLY BIOSYNTHESIZED HYDROCARBONS AND PETROLEUM HYDROCARBONS IN MARINE LIPIDS,
Woods Hole Oceanographic Institution, Mass.
J. W. Farrington, J. M. Teal, J. G. Quinn, T. Wade, and K. Burns.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 3, p 129-136, September 1973. 1 fig, 1 tab, 12 ref.

Descriptors: *Lipids, *Methodology, *Calibrations, Pollutant identification, Isolation, Organic compounds, Chemical analysis, Oil, Separation techniques, Solvent extractions, *Gas chromatography.
Identifiers: Natural organics, Marine environment, Interlaboratory studies, Flame ionization gas chromatography, *Petroleum hydrocarbons, Chemical composition, Chemical concentration, Column chromatography, Thin layer chromatography, Accuracy, Precision, Sample preparation, Biosynthesis, Petroleum products, Pristane, Squalene, Saponification, Petroleum distillates, Phytane, Phytadienes, n-Alkanes, South Louisiana crude oil.

An intercalibration exercise has been conducted to determine the accuracy and precision of hydrocarbon analyses. Column chromatography or thin layer chromatography was used to isolate the hydrocarbons from other lipids. Gas chromatography was then used as a screening method to select hydrocarbon extracts whih would be further analyzed by GC-mass spectrometry and other combinations of spectrophotometric and wet chemistry methods to determine the concentration of petroleum hydrocarbons in the samples. The presence or absence of the unresolved complex mixture signal in the hydrocarbon gas chromatograms served as the initial criterion for determining petroleum contamination. A homologous series of peaks in the chromatograms provided supplemental evidence of petroleum contamination which was then confirmed analytically. Three laboratories analyzed a reference sample (IDOE-5) consisting of cod liver lipids spiked with 371.8 ppm of a distillate cut (nC16 to nC28) of South Louisiana crude oil. The results were fairly accurate and agreed very well for the concentrations of both petroleum and recently biosynthesized pristane and squalene. Using GC as the initial screening method is fairly accurate and precise for hydrocarbons in the boiling range 287-450C with a polarity suitable for column or thin layer chromatographic isolations. The methods as employed here would not detect asphaltenes; O, N, S containing aliphatic and cyclic compounds; nor concentrations of hydrocarbons much above or below the boiling range specified above. (Holoman-Battelle)
W74-02390

THE DETERMINATION OF PENTACHLOROPHENOL AND HEXACHLOROPHENE IN HUMAN ADIPOSE TISSUE,
Environmental Protection Agency, Perrine, Fla. Perrine Primate Lab.
T. M. Shafik.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 1, p 57-63, July 1973. 2 fig, 1 tab, 15 ref.

Descriptors: *Chemical analysis, *Pollutant identification, *Mass spectrometry, Separation techniques, Solvent extractions, Phenolic pesticides, Chlorinated hydrocarbon pesticides, *Gas chromatography, Methodology, Antibiotics (Pesticides), Bactericides, Fungicides, Pollutants.
Identifiers: Electron capture gas chromatography, *Adipose tissue, Pentachlorophenol, *Trace levels, Quantitative analysis, *Hexachlorophene, Chemical recovery, Sample preparation, Animal tissue, Chlorinated hydrocarbons, Ethylation, Organic solvents.

A method was developed for determining low levels of pentachlorophenol (PCP) and hexachlorophene (HCP) in human adipose tissue. 200 mg of adipose tissue were accurately weighed into a Duall tissue grinder to which hexane was added. The sample was mixed on a Vortex mixer and allowed to stand for about 30 min. The sample was then ground, washed with hexane, and combined with 10 percent NaOH. This mixture was then mixed on the Vortex mixer for 1 min and centrifuged to separate the 2 layers. Several extractions with hexane and diethyl ether were carried with the final hexane extract containing ethylated PCP and HCP being transferred to a silica gel microcolumn for separation. Identification was made by electron capture gas chromatography. Confirmation of the diethyl ether of hexachlorophene and the ethyl ether of pentachlorophenol was accomplished by mass spectral direct probe analysis. The limits of detectability for PCP and HCP in adipose tissue are 5 and 10 ppb, respectively. Samples from the pooled human fat weighing 100-300 mg were analyzed for both

PCP and HCP using the procedure described in the analysis of adipose tissue. An average of 5 ppb PCP was found in six replicates and 30 ppb HCP in 10 replicates of human adipose tissue. Replicate samples of the pooled fat (100-300 mg) were spiked with 4.6 ng PCP and 10 ng HCP. The average recoveries of PCP and HCP from the replicates analyzed were 75 percent and 96 percent, respectively. (Holoman-Battelle)
W74-02391

POLYCHLORINATED TERPHENYLS IN PAPERBOARD SAMPLES,
Ontario Research Foundation, Sheridan Park. Pesticide and Trace Analytical Lab.
G. H. Thomas, and L. M. Reynolds.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 1, p 37-41, July 1973. 2 fig, 10 ref.

Descriptors: *Chemical analysis, *Pollutant identification, *Polychlorinated biphenyls, *Gas chromatography, Methodology, Estimating, Organic compounds, Pollutants, Foods, Aroclors.
Identifiers: *Polychlorinated terphenyls, *Paperboard, Packaging materials, Sample preparation, Aroclor 5460, Electron capture gas chromatography.

The detection, estimation, and confirmation of the identity of polychloroterphenyls (PCTs) as well as polychlorobiphenyls (PCBs) are described for paperboard and food packaging material. The sample is blended, and an aliquot Soxhlet extracted, concentrated, cleaned-up on Florisil, and subjected to a 'PCB split' on Florisil. For waxy samples, the residue from extraction is dissolved in 5 percent benzene in acetone with slight warming; the solution chilled in a dry ice/methanol bath for 3 min; the flocculent precipitate filtered; and the filtrate concentrated and treated as above. The PCT content of cleaned-up sample extracts is screened and quantified using gas chromatography. Approximately 100 paperboard samples have been analyzed with PCT levels of 0-163 ppm and PCB levels of 0-20 ppm. Two satisfactory gas chromatography systems have been developed for the estimation of PCTs. (Holoman-Battelle)
W74-02392

THE USE AND EFFECT OF MIXED STANDARDS ON THE QUANTITATION OF POLYCHLORINATED BIPHENYLS,
National Marine Fisheries Service, Seattle, Wash. Pacific Fishery Products Technology Center.
F. L. Beezhold, and V. F. Stout.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 1, p 10-15, July 1973. 2 fig, 1 tab, 12 ref.

Descriptors: *Polychlorinated biphenyls, *Pollutant identification, *Separation techniques, Aroclors, Chemical analysis, Fish, Gas chromatography, Channel catfish.
Identifiers: *Quantitative analysis, *Mixed standards, Animal tissues, Mixtures, Menhanden, Brevoortia tyrannus, Ictalurus punctatus, Carcharhinus falciformis, Aroclor 1254, Aroclor 1260, Liver, Fish meal.

A study was made of the problems encountered when the chromatogram of a sample being analyzed for PCB's via GLC cannot readily be compared to a particular Aroclor standard. The use of mixed Aroclor standards was proposed and a study made of the effect of mixed standards on the analytical results. It was found that the choice of a standard could alter the values by more than a factor of 2. In addition, the particular mixture used as a standard should be reported along with resulting values. (Holoman-Battelle)
W74-02393

APPLICATIONS, INVOLVING THE IODIDE ION. VIII. DIRECT AND INDIRECT DETERMINATION OF MERCURY (I) AND ANALYSIS OF MIXTURES. ANALYSIS OF CHROMIUM (VI)-CHROMIUM (III) MIXTURES. DETERMINATION OF HYPOCHLORITE,
Cairo Univ., Giza (Egypt). Faculty of Science.
H. Khalifa, and Y. M. Issa.
Microchemical Journal, Vol 18, No 4, p 436-444, August 1973. 8 tab, 11 ref.

Descriptors: *Mercury, *Volumetric analysis, *Chromium, *Methodology, Iodides, Heavy metals, Aqueous solutions, Chemical analysis, Pollutant identification.
Identifiers: *Potentiometric titration, *Hypochlorites, Mixtures, Accuracy, Precision, Detection limits.

Mercury (I), down to 3 ppm, has been accurately determined by direct titration with iodide or by back-titrating excess of iodide with mercury (II) using silver amalgam as the indicator electrode. The direct method and additional volumetric ones were applied to the rapid analysis of various mixtures involving mercury (I) with fair accuracy and precision. Analysis of Cr (VI)-Cr (III) mixtures involved potentiometric back-titration of excess iodide and of excess EDTA separately with mercury (II). Back-titration of excess iodide was successfully applied to the determination of hypochlorite. (Holoman-Battelle)
W74-02395

MICRODETERMINATION OF ARSENIC (III) AND OSMIUM (VIII) THROUGH OSMIUM--THIOUREA REACTION,
Andhra Univ., Waltair (India). Dept. of Chemistry.
P. P. Naidu, and G. G. Rao.
Microchemical Journal, Vol 18, No 4, p 422-427, August 1973. 1 fig, 3 tab, 3 ref.

Descriptors: *Chemical analysis, *Aqueous solutions, *Pollutant identification, *Chemical reactions, Color reactions, Spectrophotometry, Cations, Anions, Alkali metals, Alkaline earth metals, Heavy metals, Catalysts, Halogens, Methodology.
Identifiers: *Arsenic, *Osmium, Trace levels, Quantitative analysis, Ionic interference, Accuracy, Chemical interference, Osmium-thiourea reaction, Complexation, Thiourea.

The osmium-thiourea reaction described in previous methods for the determination of osmium and arsenic was slow under the conditions utilized. A new method has been proposed for the rapid determination of osmium without waiting 30 minutes for the attainment of full color intensity. With this procedure only 1 ml of 1 percent thiourea is necessary. Arsenic (III) catalyzed the reaction. Qualitative and quantitative methods are described for the determination of both osmium and arsenic. Interference study of 30 ions showed they do not interfere. (Holoman-Battelle)
W74-02396

A HIGH-SPEED LIQUID CHROMATOGRAPH WITH A FLOW-SPECTROFLUORIMETRIC DETECTOR AND THE ULTRAMICRO-DETERMINATION OF AROMATIC COMPOUNDS,
Kyoto Univ. (Japan). Dept. of Chemistry.
H. Hatano, Y. Yamamoto, M. Saito, E. Mochida, and S. Watanabe.
Journal of Chromatography, Vol 83, p 373-380, August 29, 1973. 6 fig, 1 tab, 10 ref.

Descriptors: *Instrumentation, *Chemical analysis, *Aromatic compounds, *Pollutant identification, *Organic compounds, Laboratory equipment, Separation techniques, Vitamins, Fluorescence, Methodology, Research equipment.
Identifiers: High speed liquid chromatography, Flow spectrofluorimetric detector, Quantitative analysis, Spectrofluorimetry, Trace levels, Sensitivity, Aromatic hydrocarbons, Vitamin B2, Vitamin B3, Vitamin B6, Naphthalene, Anthracene, Pyrene, Emission spectra, Benz (a)anthracene, Benz (a)pyrene, Benz (e)pyrene, Excitation spectra.

A high-speed liquid chromatograph has been used with a new spectrofluorimetric detector, which is more sensitive than a normal ultraviolet absorption or spectrophotometric detector for fluorescent compounds. The spectrofluorimeter is equipped with double-beam optics and with a flow-cell, 3 microliters in volume, and is used to record the emission and excitation spectra of the separated components during the chromatographic separation by stopping the elution at peak maxima. This technique enables both qualitative identification and quantitative determination of the separated components. Selective recording of chromatograms is possible by varying the wavelengths for emission and excitation. Mixtures of vitamins B2, B3, and B6, and of naphthalene, anthracene, pyrene, benz (a)anthracene, benz (a)pyrene and benz (e)pyrene have been separated and identified. (Holoman-Battelle)
W74-02397

ION-EXCHANGE SEPARATIONS ON MIXED COLUMNS,
Tokyo Univ. (Japan). Inst. of Industrial Science.
T. Yamabe.
Journal of Chromatography, Vol 83, p 59-65, August 29, 1973. 4 fig, 4 ref.

Descriptors: *Separation techniques, *Cations, Heavy metals, Anion exchange, Cation exchange, Hydrogen ion concentration, Ion exchange, Organic acids, Copper, Zinc, Lead, Cobalt, Cadmium.
Identifiers: Mixed columns, *Ion exchange chromatography, Ion exchange resins, *Elution, *Organic hydroxy acids, Rare earth elements, Lactic acid, Tartaric acid, Chelating agents, Terbium, Lutetium, Thulium, Erbium, Holmium, Dysprosium, Gadolinium, Eluents, Retention time, Europium, Samarium, Neodymium, Praseodymium, Cerium, Chemical concentration.

The separation of metal ions by elution with a solution containing a chelate-forming agent, namely an organic hydroxy acid (lactic acid or tartaric acid) was investigated by changing the mixing ratio (gamma) of the cation- and anion-exchange resins and by changing the pH of the eluent. When the concentration of lactic acid was 0.5 M at pH 2.8 and gamma equals 1/2, a mixed sample of Lu, Tm, Er, Ho, Dy, Tb and Gd was completely separated within 100 min. When the concentration of tartaric acid was 0.25 M at pH 3.0 and gamma equals 2, a mixed sample of Cu, Zn, Pb, Co and Cd was completely separated within 90 min. (Holoman-Battelle)
W74-02398

DETERMINATION OF ZINC BY FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Ohio State Univ., Columbus. Coll. of Medicine.
D. Kurz, J. Roach, and E. J. Eyring.
Analytical Biochemistry, Vol 53, No 2, p 586-593, June 1973. 2 tab, 40 ref.

Descriptors: *Zinc, *Aqueous solutions, *Chemical analysis, Urine, Instrumentation, Pollutant identification, Anions, Cations, Heavy metals, Methodology, Calcium, Iron, Copper, Potassium, Sodium, Nitrates, Sulfates, Iodides, Chlorides.
Identifiers: *Biological samples, *Flameless atomic absorption spectrophotometry, Serum, Ionic interference, Chemical recovery, Sample preparation, Body fluids, Chemical interference, Lithium, Acetates.

The flameless atomic absorption method described is a simple, rapid, accurate

microtechnique for determining zinc in aqueous solutions, serum, or urine. It requires no sample pretreatment, only 1.0 microliter of sample per determination, no correction for viscosity differences between sample and standard solutions, and is not subject to ionic or organic interference. The average recovery of added zinc in serum is 97.5 percent and in urine is 97.6 percent. The values obtained for serum (mean plus or minus SD: 94.6 plus or minus 11.0 micrograms/100 ml; N equals 25) and urine (range: 600-1000 micrograms/24 hr; N equals 4) are comparable to the values reported in the literature. The coefficient of variation was less than 5.0 percent in all cases. The qualitative concentration limit was 0.009 microgram/100 ml. The techniques and instrumentation described are also applicable to a number of trace minerals of common interest. (Holoman-Battelle)
W74-02399

ATOMIC ABSORPTION AND FLUORESCENCE SPECTROMETRY WITH A CARBON FILAMENT ATOM RESERVOIR. PART XIV. THE DETERMINATION OF VANADIUM IN FUEL OILS,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
G. L. Everett, T. S. West, and R. W. Williams.
Analytica Chimica Acta, Vol 66, No 2, p 301-303, September 1973. 1 tab, 3 ref.

Descriptors: *Chemical analysis, *Pollutant identification, Instrumentation, Solvent extractions, Heavy metals, Methodology, Separation techniques, Pollutants, Oil, *Spectrophotometry.
Identifiers: Petroleum products, *Fuel oil, Atomic absorption spectrophotometry, Fluorescence spectrophotometry, Carbon filament atom reservoir, *Vanadium, Reproducibility, Precision, Detection limits, Sensitivity, Acid stripping, Extraction efficiency, Sample preparation, Organic solvents, 1- (2-Pyridyl-azo-2-naphthol), Inorganic acids, Hydrochloric acid.

The carbon filament atom reservoir technique for determining vanadium in aqueous media and Cu, Ag, and Ni in lubricating oils has been extended to include vanadium in petroleum products. A 10-ml sample solution was shaken with 2 M HCl for 5 min and separated. 0.1 percent 1- (2-pyridyl-azo-2-naphthol) (PAN) in ethanol was added to the acid layer and the pH adjusted to 4.0 with concentrated ammonia. The vanadium-PAN complex was then extracted with chloroform and analyzed. This method has an overall extraction efficiency of greater than 95 percent; the detection limit of V in the original sample is 0.007 ppm (w/w). The sensitivity of the method (1 percent abs.) was 0.013 pg and the detection limit (S:N equals 2) was 0.03 pg; the reproducibility for 15 replicates at the 10-ng level was plus or minus 4 percent. (Holoman-Battelle)
W74-02400

NUCLEAR MAGNETIC RESONANCE RELAXATION TITRATION,
Technische Hochschule, Darmstadt (West Germany). Eduard-Zintl-Institut.
For primary bibliographic entry see Field 02K.
W74-02402

ISOLATION AND CLEANUP OF ORGANOPHOSPHORUS INSECTICIDES AND THEIR OXONES FROM ANIMAL TISSUES,
Institute of Industrial Hygiene and Occupational Diseases, Bratislava (Czechoslovakia).
A. Hladka, and J. Kovac.
Zeitschrift fur Analytische Chemie, Vol 265, No 5, p 339-342, July 30, 1973. 3 fig, 1 tab, 10 ref.

Descriptors: *Isolation, *Pollutant identification, *Radiochemical analysis, *Phosphothioate pesticides, *Pesticide residues, Solvent extractions, Organophosphorus pesticides, Insecticides, Radioactivity techniques, Chemical analysis, Selectivity.
Identifiers: *Oxones, Animal tissues, Radiochromatography, Isomers, Chemical recovery, Precision, Sample preparation, Metabolites, Cleanup, Malathion, Blood, Muscle, Liver, Parathion, Malaoxone, Paraoxone, Fenitrothion, Fenitrooxone, Paper chromatography, Sensitivity, Rats.

A simple isolation and cleanup procedure has been developed for the determination of organophosphorus insecticides and their oxones in animal tissues. This procedure partly unites extraction of organophosphorus pesticides and their oxones with cleanup by column chromatography. Most polar coextracts remain on the column and in its further processing the eluate does not tend to form emulsion. The process has been studied on model mixtures of P-32- and C-14-labelled pesticides with tissues as well as after application of pesticides to white rats. The average recovery of the method is 90.5 percent, with a standard deviation of plus or minus 5.1 percent. (Holoman-Battelle)
W74-02403

SELECTION OF EXPERIMENTAL CONDITIONS FOR THE PHOTOMETRIC COMPLEX FORMATION TITRATIONS OF METALS IN THE PPM-RANGE,
Amsterdam Univ. (Netherlands). Physics Lab.
J. Kragten.
Zeitschrift fur Analytische Chemie, Vol 264, No 5, p 356-361, June 13, 1973. 8 fig, 13 ref.

Descriptors: *Metals, *Pollutant identification, Volumetric analysis, Chemical analysis, Zinc, Color reactions, Photometry, Selectivity.
Identifiers: Complexometric titration, *Chemical indicators, *Metal complexes, Travel levels, Chromogenic reagents, Bismuth, Absorbance, EDTA, Xylenol Orange, Thorium, Precision, Data interpretation, Semi Xylenol Orange, Complexation, PAR, TAR.

Metals can be complexometrically titrated in the ppm-range in the presence of equivalent amounts of indicator. When (2:2) metal-indicator complexes predominate in solution, the end-points found from the 'L'-shaped absorbance-volume curves by extrapolation, are generally systematically shifted. This can be avoided by a proper choice of the indicator. Mathematical conditions previously derived are transformed to practical titration conditions, which, applied to diagrams for Bi and Zn, lead to the selection of optimum experimental conditions for these metals. The procedure is generally applicable and remains suitable even when a lack of data requires some preliminary investigations. (Holoman-Battelle)
W74-02404

AMPEROMETRIC TITRATION OF MERCURY (II) WITH EDTA, DTPA AND TRIEN IN THE PPM-RANGE,
Laboratorium voor Analytische Scheikunke, Amsterdam (Netherlands).
W. E. van der Linden, and J. Dieker.
Zeitschrift fur Analytische Chemie, Vol 264, No 5, p 353-355, June 13, 1973. 2 fig, 1 tab, 2 ref.

Descriptors: *Volumetric analysis, *Mercury, Electrochemistry, Heavy metals, Trace elements, Chemical analysis, Hydrogen ion concentration, Iron, Copper, Pollutant identification.
Identifiers: *Amperometric titration, *EDTA, *DTPA, *TRIEN, *Metal complexes, Trace levels, Rotating gold electrodes, Chemical interference, Precision, Bismuth, Thorium, Rotating mercury film electrodes, Rotating platinum electrodes, Metal-DTPA complexes, Metal-EDTA complexes, Metal-TRIEN complexes, Stability constants.

Mercury (II) can be titrated at pH 2.5-3 with EDTA, DTPA and TRIEN. The titration is followed amperometrically making use of a rotating gold-electrode at a potential of plus 0.25 V vs. S.C.E. Especially the use of DTPA allows the determination of small amounts of mercury (II (down to 1 microgram). The standard deviation is 2-3 percent. A correction for the systematic negative error of approximately 4 percent in the case of EDTA and 8 percent in the case of DTPA, mainly caused by the faradaic reaction at the electrode, can easily be made. Bismuth, iron and thorium will interfere, but on addition of fluoride the interference of thorium and iron can be masked. TRIEN showing a better selectivity of mercury towards iron has the lowest conditional stability constant and will not be suited to the titration of very low concentrations. Copper may be present in a thousand fold concentration. About equivalent amounts of iron (III) can be titrated in one run with mercury. In that case two end-points are obtained, the first one for iron, the second one for mercury. The ratio of the conditional constants of mercury to those for copper and iron is more favorable for DTPA and especially TRIEN. (Holoman-Battelle)
W74-02405

ANALYSIS BY MEANS OF GAS BUBBLE ELECTRIFICATION,
Imperial Coll. of Science and Technology, London (England). Dept. of Metallurgy.
For primary bibliographic entry see Field 02K.
W74-02406

A PNEUMATIC SAMPLE CHANGER FOR GAMMA-RAY SPECTROSCOPY,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07B.
W74-02407

ANALYSIS OF ALKYL ETHOXYLATES BY NMR,
Canada Packers Ltd., Toronto (Ontario). Research and Development Labs.
C. K. Cross, and A. C. MacKay.
Journal of the American Oil Chemists' Society, Vol 50, No 7, p 249-250, July 1973. 1 fig, 1 tab, 5 ref.

Descriptors: *Nuclear magnetic resonance, Surfactants, *Pollutant identification.
Identifiers: *Alkyl ethoxylates, Characterization, Nonionic surfactants, Sample preparation, Polymerization, Ethoxylates.

A new, fast, simple technique is presented, which allows complete characterization of alkyl ethoxylates in terms of average chain length of the alkyl portion and degree of polymerization. The method uses trimethylsilylation of the terminal-OH of alkyl ethoxylate to obtain a sharp distinct internal standard of nine hydrogens per molecule. The number of hydrogens responsible for the NMR at 0.7-1.5 and 3.0-3.9 ppm can be calculated and, consequently, the average chain length and average number of ethylene oxide units. Water and ethanol do not interfere since they are removed in the reaction. Results for several commercial alkyl ethoxylates were in good agreement with compositions stated by the manufacturers. (Little-Battelle)
W74-02408

IRON, ZINC, MAGNESIUM, AND COPPER CONCENTRATIONS IN BODY MEAT OF THE BLUE CRAB, CALLINECTES SAPIDUS,
Maryland Univ., Solomons. Natural Resources Inst.
D. D. Boon.
Chesapeake Science, Vol 14, No 2, p 143-144, June 1973. 1 tab, 2 ref.

Descriptors: *Copper, *Iron, *Zinc, *Magnesium, Heavy metals, Foods, *Crabs.

Identifiers: *Blue crab, Sample preparation, Atomic absorption spectrophotometry, Macroinvertebrates, Biological samples, Bioaccumulation, Callinectes sapidus, Animal tissues.

Body meat of the blue crab, Callinectes sapidus, was analyzed by atomic absorption for iron, zinc, magnesium, and copper. Samples were taken biweekly from May 6, 1971 to April 19, 1972, a total of twenty-six determinations over a one-year period. For each determination, a one pound can of unpasteurized 'regular' or 'special' crab body meat was purchased locally. One hundred grams of this meat were homogenized with 100 g of distilled water in a high speed blender and acid digested. Concentrations found were as follows: iron, 7-66 ppm; zinc, 36-68 ppm; magnesium, 384-527 ppm; and copper, 5-97 ppm. Concentrations of copper were high during May, 1971, but no seasonal trend was found. Iron and copper values were near those found by other investigators in 1939; magnesium contents were higher. (Little-Battelle)
W74-02409

AN IMPROVED BOTTOM-WATER SAMPLER,
University Coll. of Swansea (Wales). Dept. of Geology and Oceanography.
For primary bibliographic entry see Field 07B.
W74-02410

HANGING MERCURY DROP ELECTRODEPOSITION TECHNIQUE FOR CARBON FILAMENT FLAMELESS ATOMIC ABSORPTION ANALYSIS. APPLICATION TO THE DETERMINATION OF COPPER IN SEA WATER,
Texas Univ., Austin. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-02411

ADSORPTION CHARACTERISTICS OF SILBER, LEAD, CADMIUM, ZINC, AND NICKEL ON BOROSILICATE GLASS, POLYETHYLENE, AND POLYPROPYLENE CONTAINER SURFACES,
Chadron State Coll., Neb.
A. W. Struempler.
Analytical Chemistry, Vol 45, No 13, p 2251-2254, November 1973. 5 fig, 1 tab, 8 ref.

Descriptors: *Adsorption, *Aqueous solutions, *Heavy metals, *Ions, *Plastics, Physical properties, Lead, Cadmium, Zinc, Nickel, Chemical analysis, Hydrogen ion concentration, Temperature, Lighe, Methodology, Sampling, Stability, Precipitation (Atmospheric).
Identifiers: Borosilicate glass, Polypropylene, Storage containers, *Chemical loss, Silver, Flameless atomic absorption spectrophotometry, Acidification, Trace levels.

Container absorption of low concentrations of Ag, Pb, Cd, Zn, and Ni ions in aqueous solutions was studied using flameless atomic absorption spectrometry in order to develop a workable method for studying trace quantities of these ions in natural precipitation (rain, snow, hail). Only new containers (Borosilicate glass, polyethylene, polypropylene) were used after rigorous cleaning. Fifty milliliters of test solution were stored in each container during the aging period and analyzed initially at daily intervals. After several days analyses were made at 2- to 3-day intervals, or longer. The adsorption of Ag ion on borosilicate glass and polypropylene containers was studied as related to light and temperature. No single container type proved satisfactory for all ions. Polyethylene containers did not absorb cadmium or zinc. Acidification to pH 2 with HNO3 prevented silver, lead, cadmium, and zinc absorption on borosilicate glass surfaces. Acidification also prevented absorption of silver on polyethylene surfaces. Additionally, silver solutions must be maintained in the dark, even under acidified conditions, to maintain stability and minimize adsorption loss. New polypropylene containers could not be cleaned satisfactorily for cadmium and zinc studies. Extreme care was necessary to minimize contamination when working with the low ion concentrations detectable by flameless atomic absorption spectrometry. (Holoman-Battelle)
W74-02412

ENHANCEMENT OF THE SENSITIVITY AND SELECTIVITY OF THE COULSON ELECTROLYTIC CONDUCTIVITY DETECTOR TO CHLORINATED HYDROCARBON PESTICIDES,
Purdue Univ., Lafayette, Ind. Dept. of Entomology.
J. W. Dolan, and R. C. Ikell.
Analytical Chemistry, Vol 45, No 13, p 2198-2204, November 1973. 7 fig, 3 tab, 10 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Selectivity, *Separation techniques, *Gas chromatography, Polychlorinated biphenyls, Pollutant identification, Heptachlor, Temperature, Dieldrin, DDT, Aldrin, Endrin.
Identifiers: *Sensitivity, *Electrolytic conductivity detector, Detection limits, Gas flow rates, Furnace temperature, Chemical composition, Reaction gas, Aroclor 1254, Electrolytic conductivity gas chromatography, Heptachlor epoxide, alpha-Chlordane, o p'-DDT, Thermal degradation, Solvent systems, Ethanol, Dimethylsulfoxide, Formamide, gamma-Chlordane, Lindane, Pentachloronitrobenzene, p p' -DDT, p p' -DDE, Methoxychlor, Chlorobenzene, 1 2-Dichlorobenzene, 1 3-Dichlorobenzene, 1 4-Dichlorobenzene, 1 2 3-Trichlorobenzene.

Factors which influence the sensitivity and selectivity of the Coulson electrolytic conductivity detector to chlorinated hydrocarbon pesticides were determined and optimized. The most influential factors which affect sensitivity are absorptive surfaces, electrode polarization, system stability, and furnace temperature. Replacement of the standard 4-mm i.d. quartz reaction tube with one of 0.5-mm i.d., replacement of the silicone rubber septum at the furnace exit with a teflon fitting, and increasing the maximum cell voltage to 44 V dc resulted in a minimum detectability of 0.1 ng for heptachlor and a useable sensitivity of 0.4 ng as compared to 2 ng and 5 ng, respectively, for the unmodified detector. The most influential factors which affect selectivity are funace temperature, reaction gas composition, and reaction gas flow rate. Optimization of these parameters enables most chlorinated hydrocarbon pesticides to be selectively determined in the presence of other halogenated materials such as PCB with selectivities greater than 1000:1. (Holoman-Battelle)
W74-02413

HIGH PRECISION SAMPLING FOR CHROMATOGRAPHIC SEPARATIONS,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
For primary bibliographic entry see Field 02K.
W74-02414

EXPERIMENTAL STUDY OF THE PHASE--SELECTIVE ANODIC STRIPPING ANALYSIS OF MICROMOLAR CADMIUM (II) AT THE MICROMETER HANGING MERCURY DROP ELECTRODE IN 0.1 M POTASSIUM CHLORIDE,
Kentucky Univ., Lexington. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 02K.
W74-02415

THE DETERMINATION OF PHENOLS IN AQUEOUS EFFLUENTS,
British Coke Research Association, Chesterfield (England).
R. L. Cooper, and K. C. Wheatstone.
Water Research, Vol 7, No 9, p 1375-1384, September 1973. 5 fig, 5 tab, 20 ref.

Descriptors: *Phenols, Effluents, *Separation techniques, *Pollutant identification, *Industrial wastes, *Liquid wastes, Chemical analysis, Drainage water, Organic compounds, Waste water (Pollution), Solvent extractions, Methodology, Colorimetry, Water analysis, *Gas chromatography.
Identifiers: Flame ionization gas chromatography, Cresol, Xylenols, Dihydric phenols, Ethylphenols, Monohydric phenols, Detection limits, Organic solvents, Methyl isobutyl ketone, Gas liquid chromatography, Coke oven effluents, Trimethylsilyl ethers, o-Cresol, m-Cresol, p-Cresol, o-Ethylphenol, 2 5-Xylenol, m-Ethylphenol, 2 4-Xylenol, 3 5-Xylenol, p-Ethylphenol, 2 6-Xylenol, 2 3-Xylenol, 3 4-Xylenol, Catechol, 2 3 5-Trimethylphenol, 2 4 5-Trimethylphenol, 2 4 6-Trimethylphenol, 4-Methylcatechol, 2 3 6-Trimethylphenol.

A method is described for the determination of monohydric and dihydric phenols in aqueous effluents. The phenols were extracted into methyl isobutyl ketone, the trimethylsilyl ethers prepared, separated by gas-liquid chromatography and detected by a flame ionization detector. Complete separation of phenol, cresols, xylenols, ethylphenols and dihydric phenols was achieved using dual stainless steel columns packed with Chromosorb W (AW-DCMS) coated with 5 percent tri-2,4-xylenyl phosphate and by linear temperature programming from 75 C to 125 C at 1.5 C/min; concentrations down to 0.1 mg/l of each phenol in the original sample could be determined. The results obtained by the gas chromatographic method were compared with those using standard colorimetric methods of analysis for carbonization effluents arising from different sources. The method is generally applicable to wastes containing phenols. (Holoman-Battelle)
W74-02417

ORGANIC DESORPTION FROM CARBON-II. THE EFFECT OF SOLVENT IN THE DESORPTION OF PHENOL FROM WET CARBON,
Missouri Univ., Rolla. Graduate Center for Materials Research.
R. H. Pahl, K. G. Mayhan, and G. L. Bertrand.
Water Research, Vol 7, No 9, p 1309-1322, September 1973. 7 fig, 3 tab, 11 ref.

Descriptors: *Phenols, *Activated carbon, Methodology, *Separation techniques, *Aqueous solutions, Adsorption, Solvent extractions, Moisture content, Pollutant identification, Sorption, Water, Freeze drying, Spectrophotometry, Physical properties, Thermodynamics, Organic compounds, Pollutants.
Identifiers: *Desorption, *Organic solvents, Pollutant removal, Wet carbon, *Inorganic solvents, Heat of solution, Benzene, Cyclohexane, Acetonitrile, Dodecyl alchol, Methyl alcohol, Diozane, Cellosolve acetate, Tetrahydrofuran, Dimethylformamide, Molar absorptivity, Thermogravimetric analysis, Continuous flow system, Soxhlet extraction, Ultraviolet spectrophotometry, Calorimetry, Heat of formation.

The desorption of phenol from active carbon was studied using cyclic and continuous flow desorbers. The absorptivity index of phenol in each of 10 solvents was determined by spectrophotometry using a set of standard solutions of phenol in each solvent. Phenol was adsorbed onto the carbon in a polyethylene container; and the carbon was separated from solution by filtration. The damp carbon was placed in flasks, frozen, and vacuum-dried. After 36-48 h the flasks were removed,

weighted, and the 'dry' carbon stored. Final drying was done by freeze drying and confirmed by thermogravimetric analysis. A Soxhlet extraction apparatus was used to desorb phenol from carbon using methanol, acetonitrile and cyclohexane. A continuous flow desorber constructed from a modified Soxhlet extractor was used so that all the solvents could be used under identical flow and temperature conditions. The heat of solution of phenol in methanol, dodecyl alcohol, acetonitrile and cellosolve acetate was determined using the calorimeter and experimental procedure described by Betrand, Beaty and Burns (1968). A wide difference in desorption capabilities was shown among the 10 solvents. The system employed was complex, with water being present in addition to phenol in the carbon. An attempt to correlate the desorption data with the physical properties of the phenol and solvent and regular solution theory is made. A thermodynamic approach using the linear free energy-enthalpy relationship produced a reasonable correlation of the heat of formation of the phenol-solvent hydrogen bond with the desorption data. This indicated that the desorption of the phenol from carbon in this complex system is dependent upon the ability of the solvent to form hydrogen bonds with the phenol. (See also W74-02419) (Holoman-Battelle)
W74-02418

ORGANIC DESORPTION FROM CARBON-II. THE EFFECT OF SOLVENT IN THE DESORPTION OF PHENOL FROM DRY CARBON,
Missouri Univ., Rolla. Graduate Center for Materials Research.
W. W. Knickmeyer, K. G. Mayhan, and G. L. Bertrand.
Water Research, Vol 7, No 9, p 1323-1330, September 1973. 2 fig, 7 tab, 2 ref.

Descriptors: *Activated carbon, *Adsorption, Methodology, *Phenols, *Separation techniques, Pollutant identification, Sorption, Thermodynamics, Solvent extractions, Water, Organic compounds, Pollutants, Physical properties.
Identifiers: *Desorption, Pollutant removal, Continuous flow system, *Dry carbon, Heat of solution, Heat of formation, Heat of wetting, Organic solvents, Molar absorptivity, Ultraviolet spectrophotometry, Dimethylformamide, 1 4-Dioxane, Acetonitrile, Tetrahydrofuran, Cyclohexane, Cellosolve acetate, Methyl alcohol, Benzene, Chloroform, Dodecane, Inorganic solvents, n-Pentane.

The desorption of phenol from active carbon was studied using a continuous flow desorber. The system used was nearly water free to reduce water-phenol interactions. An attempt to correlate the desorption data with the physical properties of phenol and solvents, in addition to regular solution theory, proved unsuccessful. A thermodynamic approach using the linear free energy-enthalpy relationship produced a general trend by using the heat of solution for phenol in solution and a reasonable correlation using the heat of formation of the phenol-solvent hydrogen bond with the desorption data. (See also W74-02418) (Holoman-Battelle)
W74-02419

THE DISTRIBUTION OF TRACE METALS AND FAUNA IN THE FIRTH OF CLYDE IN RELATION TO THE DISPOSAL OF SEWAGE SLUDGE,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Group.
For primary bibliographic entry see Field 05B.
W74-02420

AN AUTOMATED ANALYSIS FOR UREA IN SEAWATER,
Oregon State Univ., Corvallis. School of Oceanography.
J. M. DeManche, H. Curl, Jr., and D. D. Coughenower.
Limnology and Oceanography, Vol 18, No 4, p 686-689, July 1973. 1 fig, 6 ref.

Descriptors: *Ureas, *Automatic control, Methodology, *Seawater, *Pollutant identification, Water analysis, Chemical analysis, Nitrogen compounds, Organic compounds, Saline water.
Identifiers: Technicon Autoanalyzer, Sensitivity, Detection limits, Precsion.

An automated method adapted to a Technicon Auto Analyzer has been used to determine urea in seawater. In the flow system for automated analyses, a sample rate of 12/hr with a sampling time of 4.5 min and a 0.5 min wash gave good results. The sensitivity of the method with the 50-mm flow cell used was 0.018 absorbance units/(microgram-atoms urea-N)/liter. Ten replicate samples of 1.0 and 3.0 microgram-atoms urea-N/liter had standard deviations of 0.019 and 0.017 and a lower limit of detection less than 0.1 microgram-atom. For most precise measurements at low levels, the limit of detection is less than 0.05 microgram-atom urea-N/liter. Beer's law was found to apply over the range of 0-10 microgram-atoms urea-N/liter. The method was used to measure urea in seawater samples collected on cruise C72091 of the RV Cayuse to the Inside Passage of Southeast Alaska in October 1972. The lowest value was 0.25 microgram-atom urea-N/liter and the highest 2.20. The median value for 308 samples taken at depths from 1 to 200 m was 0.59. The automated method is rapid and sensitive enough to measure in situ urea concentrations before enrichment with N-labeled urea in nitrogen uptake experiments, eliminating the problems reported by McCarthy (1972). (Holoman-Battelle)
W74-02421

MERCURY IN FISH, SEDIMENTS, AND WATER IN LAKE OAHE, SOUTH DAKOTA,
Environmental Protection Agency, Kansas City, Mo. Region VII.
C. M. Walter, F. C. June, and H. G. Brown.
Journal Water Pollution Control Federation, Vol 45, No 10, p 2203-2210, October 1973. 1 fig, 3 tab, 10 ref.

Descriptors: *Mercury, Freshwater fish, *Lake sediments, Water analysis, *Pollutant identification, Chemical analysis, Heavy metals, Methodology, Water sampling, Bottom sampling, Tailwater, Walleye, Sauger, White bass, Yello perch, Channel catfish, Carp, Soil analysis, Aquatic soils, *Spectrophotometry, *South Dakota.
Identifiers: Flameless atomic absorption spectrophotometry, *Lake Oahe (So. Dak), Lake Sharpe (So. Dak.), Sample preparation, Chemical recovery, Cheyenne River, Animal tissues, Background levels, Northern pike, Esox lucius, Stizostedion vitreum vitreum, Sauger, Stizostedion canadense, Morone chrysops, Perca flavescens, White crappie, Pomoxis annularis, Black crappie, Pomoxis nigromaculatus, Foster Bay, Fishgut Creek, Oak Creek, Agency Creek, Whitlocks Bay, Blue Blanket Creek, Grand River, Spring Creek, Ruby Creek.

Analyses for total mercury content were made of fish, sediment, and water samples collected in several locations in Lake Oahe, South Dakota, and its tailwaters. Preparation of fish samples for Gh analysis consisted of thawing frozen specimens, removal of a portion of the flesh, and rigorous chemical digestion. The concentration of total Hg in the sample was determined by the Hatch and Ott flameless atomic absorption method using a Hg analyzer coupled to stripchart recorder. A total of 43 sediment samples was collected, placed in polyethylene bags and frozen. Subsamples were digested, diluted to a 500-ml volume, and analyzed for Hg content as above. Water samples were also analyzed as above. Mercury concentrations equal to or exceeding 0.5 mg/kg occurred in 30 of 225 fish samples tested (13 percent). Higher concentrations were found most frequently in predatory game fishes, primarily northern pike and walleye, from the Cheyenne River arm. Sediment samples with mercury concentrations above 0.5 mg/kg were found only in the Cheyenne River arm, but water samples contained only neglibible amounts of mercury. Recommendations for further studies are presented. (Holoman-Battelle)
W74-02423

SALINITY CORRECTIONS FOR DISSOLVED OXYGEN MEASUREMENTS,
National Oceanographic Instrumentation Center, Washington, D.C.
B. S. Pijanowski.
Environmental Science and Technology, Vol 7, No 10, p 957-958, October 1973. 4 fig, 1 ref.

Descriptors: *Salinity, *Dissolved oxygen, *Measurement, *Water temperature, Methodology, Pollutant identification, Compensation.
Identifiers: Correction factors.

Presented is a convenient method of compensating for the effects of salinity on the data acquired from dissolved oxygen meters. The basic design of most of these instruments does not include provision for salinity compensation or, at best, uses a fixed value. The need for a general method of compensation is emphasized, particularly when such meters are to be used in estuarine studies. The correction technique is based on earlier work by Gilbert et al. and is presented in a form suitable for development by computer for specific instruments. Illustrations demonstrating the methodology include curves for a meter intended basically for use in freshwater as well as for another which employs a fixed value of salinity compensation. The correction factors are dimensionless and can be applied to correct dissolved oxygen values in units of either ppm or ml/1. (Holoman-Battelle)
W74-02424

TOXAPHENE ACCUMULATION IN FISH IN LAKES TREATED FOR ROUGH FISH CONTROL,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 05C.
W74-02425

OCCURRENCE OF HEXACHLOROPHENE AND PENTACHLOROPHENOL IN SEWAGE AND WATER,
Oregon State Univ., Corvallis. Dept. of Agricultural Chemistry.
D. R. Buhler, M. E. Rasmusson, and H. S. Nakaue.
Environmental Science and Technology, Vol 7, No 10, p 929-934, October 1973. 4 fig, 5 tab, 8 ref.

Descriptors: *Water analysis, *Gas chromatography, *Mass spectrometry, *Pollutant identification, *Sewage, Chemical analysis, Phenolic pesticides, Chlorinated hydrocarbon pesticides, Water sampling, Sewage effluents, Water pollution, Waste water (Pollution), Fungicides, Antibiotics (Pesticides), Sewage treatment, Radioactivity techniques, Efficiencies, Bactericides.
Identifiers: *Hexachlorophene, *Pentachlorophenol, Sample preparation, Chemical recovery, Pollutant removal, Influents, Composite samples, Slimicides, Electron capture gas chromatography, Willamette River, Thin layer chromatography, Methylation, Chlorinated hydrocarbons.

Concentrations of hexachlorophene (HCP) and pentachlorophenol (PCP) in sewage and water samples have been analyzed by gas chromatography. Sewage influent or effluent or river water samples were acidified with 4 N H_2SO_4 and extracted three times with chloroform. The

chloroform extracts were dried with anhydrous Na2SO4 and evaporated to dryness in vacuo at 20C to minimize any losses of volatile components. The residues were dissolved in CH2Cl2-methanol (5:1), ethereal diazomethane added, and the mixtures allowed to stand for 30 min at room temperature. After methylation, and samples were evaporated to dryness in a stream of N2, redissolved in benzene, dried with Na2SO4, made up to 5 ml analyzed. HCP and PCP levels in 24-hr composite samples of sewage influent collected simultaneously from three Oregon cities ranged between 20-31 ppb and 1-5 ppb, respectively. Composite effluent values from these same sewage treatment plants were 6-12 ppb HCP and 1-4 ppb PCP, reflecting a 60-70 percent removal of HCP and a 4-28 percent removal of PCP. Analyses of daily and hourly water samples from the Willamette River collected just upstream from the city of Corvallis, Oregon, showed that HCP and PCP were present in river water in concentrations varying between 0.01-0.1 ppb and 0.10-0.70 ppb, respectively. Conventional processing of raw Willamette River water at the Corvallis Taylor water treatment plant removed about 60 percent of the HCP and PCP originally present in the water leaving about 40 percent of these chlorophenols in the finished drinking water. Identifications of HCP and PCP in sewage effluent and influent, Willamette River water and treated drinking water were confirmed by mass spectrometry. (Holoman-Battelle)
W74-02426

DETECTION AND ESTIMATION OF ISOPROPYL METHYLPHOSPHONOFLUORIDATE AND O--ETHYL S-DIISOPROPYLAMINOETHYL-METHYLPHOSPHONOTHIOATE IN SEA-WATER IN PARTS-PER-TRILLION LEVEL,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
H. O. Michel, E. C. Gordon, and J. Epstein.
Environmental Science and Technology, Vol 7, No 11, p 1045-1049, November 1973. 7 tab, 9 ref.

Descriptors: Estimating, *Seawater, *Pollutant identification, *Water analysis, Poisons, Chemical reactions, Organic compounds, Water pollution, Inhibitors, Chemical analysis, Sodium chloride, Hydrogen ion concentration, Temperature, Water sampling, Hydrolysis.
Identifiers: Nerve gas, *Trace levels, *Anticholinesterases, *Enzymatic techniques, Enzymatic inhibitors, Isopropyl methylphosphonofluoridate, Acetylcholinesterase, Substrate concentration, Butyryl cholinesterase, Acetylcholine, Acetylthiocholine, Phenylacetate, rhonitro Phenylacetate, Mixtures, 2 6-di Cl indophenolacetate, Indoxylacetate, O-ethyl S-diisopropylaminoethyl-methlphosphonothioate, Sensitivity, Substrates.

A procedure is described for the estimation of two very potent anticholinesterase chemicals, viz., isopropyl methylphosphonofluoridate and O-ethyl S-diisopropylaminoethlmethylphosphonothioate in seawater in concentrations at the parts-per-trillion level by an enzymatic technique. Kinetic constants for the reaction of other anticholinesterases with two sources of cholinesterase and for the reaction of the cholinesterases with several substrates are given. With these data, the reader can select conditions for the development of procedures for estimating very low concentrations of these anticholinesterases in water. (Holoman-Battelle)
W74-02427

COMPARING THE QUALITY OF OUR WATERS,
Orlando Labs., Inc., Fla.
J. J. Hobbs, G. Medina, and A. Dillon.
Pollution Engineering, Vol 5, No 10, p 42-43, October 1973. 1 fig, 1 tab.

Descriptors: *Water quality, *Water chemistry, *Water properties, Rivers, Lakes, Streams, Water analysis, Chemical analysis, Bays, Springs, Lake Ontario, Lake Michigan, Lake Erie, Lake Huron, Lake Superior, Hudson River, Chesapeake Bay, Freshwater, Dissolved solids, Alkalinity, Carbonates, Bicarbonates, Alkalis (Bases), Carbon dioxide, Chlorides, Sulfates, Fluorides, Phosphates, Hydrogen ion concentration, Stability, Saturation.
Identifiers: *Natural waters, Seine River, Rappahannock River, Bay of Fundy, Cape Cod Bay, Norris Dam Lake, Glapagos Islands, South James Bay Spring, Total organic carbon.

Many extensive studies are now being conducted throughout the world on the quality of water in rivers, lakes and streams. Analyses of grab samples collected from a number of major bodies of water are presented in tabular form. It is important to note that grab sample results are of value only when related to a number of collection factors. The analysis of these samples is for the purpose of general information only. (Holoman-Battelle)
W74-02428

POTENTIALITY OF THE COUPLING OF COLUMN LIQUID CHROMATOGRAPHY AND FIELD DESORPTION MASS SPECTROMETRY,
Bonn Univ. (West Germany). Institut fuer Physikalische Chemie.
For primary bibliographic entry see Field 02K.
W74-02430

SEPARATION AND GAS-CHROMATOGRAPHIC DETERMINATION OF TRACES OF FLUORIDE, (ABTRENNUNG UND GAS-CHROMATOGRAPHISCHE BESTIMMUNG VON FLUORIDSPUREN),
Mainz Univ. (West Germany). Institut fuer Anorganische Chemie und Kernchemie.
R. Bock, and S. Strecker.
Zeitschrift fur Analytische Chemie, Vol 266, No 2, p 110-116, July 23, 1973. 8 fig, 10 tab, 9 ref.

Descriptors: *Fluorides, *Aqueous solutions, *Chemical analysis, *Separation techniques, Pollutant identification, Solvent extractions, *Gas chromatography, Chemical reactions, Chemical precipitation, Absorption.
Identifiers: *Trace levels, Flame ionization gas chromatography, Detection limits, Organic solvents, m-Xylene, Coprecipitation, Methylene chloride, Tetraphenyl antimony hydroxide, Triethyl silicon fluoride.

Traces of fluoride can be separated from aqueous solution by extraction with (C2H5)3SiCl in m-xylene or with (C6H5)4SbOH in CH2C12. Furthermore, several coprecipitation reactions were tested; absorption on hydroxyl apatite is most suitable. Determination of 0.05 microgram fluoride/ml can be performed by gas chromatography of (C2H5)3SiF in m-xylene using flame ionisation detectors; but variable blanks of 0.5-1.5 micrograms fluoride normally prevent the determination of less than ca. 3 micrograms fluoride. (Holoman-Battelle)
W74-02431

ANIONIC EXCHANGE SEPARATIONS OF THE ELEMENTS THAT CAN BE EXTRACTED WITH TRIBUTYL PHOSPHATE. II, (ANIONENAUSTAUSCHTRENNUNGEN DER MIT TRIBUTYLPHOSPHAT EXTRAHIERBAREN ELEMENTE. II),
Vienna Univ. (Austria). Analytisches Institut.
For primary bibliographic entry see Field 02K.
W74-02432

APPLICATION OF ACTIVATED CARBON FOR THE ENRICHMENT OF TRACE ELEMENTS AND THEIR DETERMINATION BY ATOMIC ABSORPTION SPECTROMETRY, (UBER DIE VERWENDUNG VON AKTIVKOHLE ZUR ANREICHERUNG VON SPURENELEMENTEN MIT NACHFOLGENDER BESTIM MUNG DURCH ATOMABSORPTIONS-SPEKTROMETRIE,
Institut fuer Spektrochemie und Angewandte Spektroskopie, Dortmund (West Germany).
E. Jackwerth, J. Lohmar, and G. Wittler.
Zeitschrift fur Analytische Chemie, Vol 266, No 1, p 1-8, July 3, 1973. 1 fig, 4 tab, 14 ref.

Descriptors: *Trace elements, *Activated carbon, *Aqueous solutions, *Chemical analysis, Heavy metals, Separation techniques, Solubility, Pollutant identification, Methodology, *Spectrophotometry.
Identifiers: Atomic absorption spectrophotometry, Enrichment, *Sample preparation, Metal chelates.

Activated carbon can be used as collector material in trace analysis. Due to the special character of activated carbon, not only insoluble compounds can be enriched, but also many soluble chelate complexes of trace elements. For that purpose the buffered aqueous solution of the analytical sample containing complexing or precipitating reagents is filtered through a small filter paper covered with 50 mg of activated carbon. The trace compounds, and in many cases also the surplus reagent are adsorbed by the collector. By treating the carbon collector with acid after the process of trace enrichment, a trace concentrate free of unwanted substances is obtained. Thus it is possible to use sensitive electrochemical and optical methods for the determination. For the determination of the enriched elements by atomic absorption spectrometry, the activated carbon suspended in diluted nitric acid can be dispersed directly into the atomizer. The carbon particles do not cause any interferences. The application and the advantages of activated carbon for enrichment of trace elements in high-purity materials is demonstrated by some analytical examples. (Holoman-Battelle)
W74-02433

DETERMINATION OF SMALL AMOUNTS OF URANIUM AFTER CONCENTRATING THROUGH EXTRACTION AND ANIONIC EXCHANGE IN A SOLVENT AGENT SYSTEM CONTAINING TRI-N-OCTYLPHOSPHINE OXIDE. (BESTIMMUNG GERINGER URANMENGEN NACH KONZENTRIERUN G DURCH EXTRAKTION UND ANIONENAUSTAUSCH IN EINEM TRI-N-OCTYLPHOSHINOXIDHALTIGEN LOSUNGSMITTELSYSTEM),
Vienna Univ. (Austria). Analytisches Institut.
J. Korkisch, and W. Koch.

Descriptors: *Separation techniques, *Pollutant identification, Solvent extractions, Anion exchange, Methodology, Fluorometry, Spectrophotometry, Molybdenum, Heavy metals.
Identifiers: *Uranium, Tri-n-octylphosphine oxide, *Solvent systems, Preconcentration, Ionic interference, Ion exchange resins, Organic solvents.

A method has been developed for the separation of uranium that is based on systematic studies of the behavior of uranium in various water-organic solvent systems containing tri-n-octylphosphine oxide (TOPO) towards various anion forms of the strongly basic anion exchanger Dowex 1,X8. In this procedure, the uranium is extracted from a 1 N hydrochloric acid solution containing ascorbic acid into diethyl ether and adsorbed from a mixture consisting of 50 vol. percent ether (0.1 N in TOPO), 45 vol. percent methylglycol and 5 vol. percent 12 N hydrochloric acid on the ion exchanger (chlorid form). Following elution with 1 M hydrochloric acid, the uranium is determined either fluorimetrically or spectrophotometrically by the thiocyanate method. By means of this anion exchange procedure, it is possible above all to separate the uranium from all ions interfering with

its fluorimetric or spectrophotometric determination and also from TOPO itself. In particular, consideration is given to the spectrophotometric determination of the uranium in the presence of larger amounts of molybdenum, and a method was worked out for the removal of this element. (Holoman-Battelle)
W74-02434

A COMPARISON OF THE CONTENT OF MICROELEMENTS IN THE WATER OF THE RIVER DANUBE NEAR VIENNA AND BELGRADE FOR 1961-1970 (EIN VERGLEICH DES GEHALTES AN SPURENELEMENTEN IM DONAUWASSER BEI WIEN UND BEOGRAD FUE 1961-1970),
Bundesanstalt fuer Wasserbiologie und Abwasserforschung, Vienna (Austria).
Von A. Frantz, R. J. Draskovic, T. Tasovac, R. Radosavljevic, and G. Petrovic.
Archiv fur Hydrobiologie, Suppl. 44, No 2, p 258-262, March 1973. 2 fig, 1 tab, 4 ref.

Descriptors: *Water analysis, *Chemical analysis, *Neutron activation analysis, *Pollutant identification, Heavy metals, Time, Chromium, Iron, Cobalt, Sodium, Spatial distribution, Temporal distribution, Alkali metals.
Identifiers: *Danube River, Scandium, Antimony, Lanthanum, Rare earth elements.

The Federal Institute of Hydrobiology and Waste Water Research in Vienna, Austria, and the Boris Kidric Institute of Nuclear Sciences in Belgrade, Yugoslavia, started systematic investigations of the River Danube to determine the amount of microelements by means of neutron activation analysis in dependence of place and time. Results of 1961-1970 are presented. (Holoman-Battelle)
W74-02436

NATURE AND STABILITY OF COMPLEX MERCURY COMPOUNDS IN SURFACE AND GROUND WATERS,
Auburn Univ. Ala. Dept. of Chemistry.
J. E. Land, W. R. Mountcastle, H. T. Peters, and D. R. Holt.
Available from the National Technical Information Service as PB-226 226 $3.50 in paper copy, $1.45 in microfiche. Alabama Water Resources Research Institute Auburn Bulletin 17, 1973. 46 p, 3 fig, 4 tab, 3 append. OWRR A-028-ALA (1).

Descriptors: Water pollution, Groundwater, Chemical properties, *Mercury, *Pollutant identification, *Ions, *Electrodes.
Identifiers: *Methylmercury Compounds.

Attempts to determine the stability constants for the methylmercury phosphato and diphosphato complexes at 25C in an aqueous media and with an ionic strength of 0.10 M (with KNO3) through the use of electromotive force measurement and half-wave potentials from the dropping mercury electrode are described. No positive results were recorded using a chloride selective ion electrode; however, a glass-nitrate selective ion electrode combination yielded reproducible and meaningful values when a solution of the ligand and methylmercury ion were titrated with standard nitric acid. Calculations of stability constants proved to be impossible since the quoted constants for the hydrolysis of the methylmercury cation are apparently in error, and corrective efforts are outlined. Reduction waves of the methylmercury chloride and hydroxide species in solution are presented and explained by postulated mechanisms involving free radical intermediates.
W74-02441

A MASS BALANCE MODEL OF TRACE METALS IN SEVERAL DELAWARE WATERSHEDS,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 05B.
W74-02443

HEAVY METALS IN THE MAIN STREAMS OF THE JAMES RIVER BASIN, MISSOURI,
Missouri Water Resources Research Center, Rolla.
P. D. Proctor, and R. J. Lance.
Available from the National Technical Information Service as PB-226 253 $3.50 in paper copy, $1.45 in microfiche. Completion Report, August 29, 1973. 60 p, 21 fig, 5 tab, 30 ref, append. OWRR A-066-MO- (1).

Descriptors: *Missouri, *Heavy metals, Streams, Seasonal, Geology, Mineralization, Physical properties, Cadmium, Copper, *Lead, *Zinc, Iron, Hydrogen ion concentration, Temperature, Alkalinity, Specific conductivity, Mercury, Mining.
Identifiers: *James River (Mo.).

Demand for water in the James River basin has greatly increased. Larger numbers of industrial plants and the presence of lead-zinc prospects in the basin are potential sources of heavy metal additions to the waters of the area. This study determines selected heavy metal content and distribution in the streams of the basin and establishes some heavy metal bench mark values for this time period. Approximately 50 water samples were collected in each of three seasons. These samples were analyzed by atomic absorption techniques. Temperature, specific conductance, pH, and effective alkalinity were measured in the field. Ranges of heavy metal content were: (1) mercury-greater than 0.1-0.3 ppb (summer only); (2) zinc-less than-80 ppb; (3) copper-less than 1-18 ppb; (4) lead-less than 1-41 ppb; (5) cadmium-less than 1-7 ppb; and (6) iron-less than 50-277 ppb. The urban areas of Springfield contribute dissolved heavy metals to the surface streams. The Southwest Springfield Sewage Treatment Plant is not a significant source. Seasonal and geographic variations are also apparent. Heavy metal contributions appear to be related to mineralized and faulted areas in the basin. Variation of heavy metals at individual sample sites is not considered of great significance. Filtered water samples meet PHS heavy metal standards for public drinking water.
W74-02445

NITROGEN, PHOSPHORUS, AND TRACE ELEMENTS IN FLORIDA SURFACE WATERS, 1970-71,
Geological Survey, Tallahassee, Fla.
B. F. Joyner.
Open-file report 73 028, 1973. 30 p, 1 fig, 2 tab, 6 ref.

Descriptors: *Nitrogen, *Phosphorus, *Trace elements, *Surface waters, *Florida, Sampling, Water analysis, Chemical analysis, Analytical techniques, Data collections, Rivers, Streams, Lakes, Estuaries, Water pollution.

Nitrogen, phosphorus, and trace-element data are summarized for samples collected at 99 selected surface water stations in Florida in 1970-71. The data were collected in cooperation with many state, county, local, and federal agencies. The network stations were selected to provide water-quality information on (1) the major stream systems in Florida under differing hydrologic regimens, (2) streams either little affected or greatly affected by man's activities, (3) lakes either little affected or greatly affected by man, (4) streams with high organic color, (5) selected major springs and (6) selected estuaries. The locations of the stations are shown on a map. The field and laboratory determinations are tabulated. Also given are sample collection procedures, sample preservation, and laboratory analytical methods. (Woodard-USGS)
W74-02476

SYSTEM FOR MONITORING CONTAMINANTS IN LIQUIDS,
F. J. Bogusz.
U. S. Patent No. 3,762,214, 3 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 72, October 2, 1973.

Descriptors: *Patents, *Water quality, *Pollutants, *Monitoring, Data processing, *Water pollution.
Identifiers: *Sensors, Electrical equipment.

A water pollution monitoring system is provided which may be coupled with data handling and processing equipment. Levels of pollutants are detected by means of sensors and an electrical signal corresponding to the pollutant level is processed for recording and/or transmission. Means are provided for automatic periodic cleaning of the sensors so that a high level of accuracy can be maintained for an extended period of time. A variety of signal conditioning circuits as well as the limit alert module, data sampling devices and an ultrasonic transducer are located within a water-tight compartment of the systems container. The data sampling sequencer may be switched into the data acquisition channels to systematically sequentially sample the various parameters of the media being monitored. A reference pulse is provided to allow a data analyst to determine and correlate the data with respect to the various sensors. (Sinha-OEIS)
W74-02493

REMOTE DETECTION OF AEROSOL POLLUTION BY ERTS,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 07B.
W74-02575

WATER TURBIDITY DETECTION USING ERTS-1 IMAGERY,
Geological Survey, Lawrence, Kans.
For primary bibliographic entry see Field 07B.
W74-02582

POLLUTED AND TURBID WATER MASSES IN OSAKA BAY AND ITS VICINITY REVEALED WITH ERTS-A IMAGERIES,
Kyoto Gakuen Univ. (Japan).
For primary bibliographic entry see Field 07B.
W74-02586

5B. Sources of Pollution

A STUDY OF FACTORS INFLUENCING THE NITROGEN AND PHOSPHORUS CONTENTS OF NEBRASKA WATERS,
Nebraska Univ., Lincoln. Dept. of Agronomy.
J. Muir, E. C. Seim, and R. A. Olson.
Journal of Environmental Quality, Vol 2, No 4, p 466-470, October-December 1973. 1 fig, 5 tab, 14 ref.

Descriptors: *Water pollution sources, *Nitrogen, *Phosphorus, *Nebraska, Fertilizers, Leaching, Farm wastes, Waste disposal, Irrigation.

The magnitudes and sources of nutrient N and P in Nebraska waters were determined. There is little relation between N and P concentrations of the water and agricultural use of fertilizers. Nutrient levels in the water are governed more by human and livestock densities and intensity of irrigation development than by agronomic production factors. Only at sites of intensive irrigation development on very sandy soils and with irrigation of valley positions of shallow water table has fertilizer N contributed substantially to a reduction in groundwater quality. Nutrient concentrations in streams fluctuate widely with varied time and rate of organic waste intrusions and subsequent biological

assimilation and with major runoff events. Reservoirs on streams also have a major modifying action in reducing sediment and fertility load. The observed higher N content of streams during periods of peak flow can be attributed partially to the high N content of precipitation and its direct runoff into streams during periods of high rainfall intensity. (Knapp-USGS)
W74-02151

AGRICULTURAL CHEMICALS IN SURFACE RUNOFF, GROUND WATER, AND SOIL: 1. ENDRIN,
Agricultural Research Service, Baton Rouge, La.
G. H. Willis, and R. A. Hamilton.
Journal of Environmental Quality, Vol 2, No 4, p 463-466, October-December 1973. 4 tab, 11 ref.

Descriptors: *Path of pollutants, *Endrin, Pesticide kinetics, Chlorinated hydrocarbon pesticides, Runoff, Water pollution sources, Soil water, Groundwater, *Agricultural chemicals.

Endrin was applied at a rate of 0.337 kg/ha to sugarcane plots instrumented to sample surface runoff and groundwater. Runoff, groundwater, and soil samples were collected over a 2-year period and analyzed for endrin. Only small amounts of endrin were lost annually in runoff (less than 0.2% of that applied), and little endrin accumulated in soil. Trace amounts of endrin appeared to move through soil in the plots but not through soil columns. A delay of 72 hours between application and rainfall decreased the amount of endrin in runoff, groundwater, and soil. (Knapp-USGS)
W74-02152

MINIMIZING NITRATE SEEPAGE FROM THE HULA VALLEY INTO LAKE KINNERET (SEA OF GALILEE): 1. ENHANCEMENT OF NITRATE REDUCTION BY SPRINKLING AND FLOODING,
Technion-Israel Inst. of Tech., Haifa. Soils and Fertilizers Lab.
A. Raveh, and Y. Avnimelech.
Journal of Environmental Quality, Vol 2, No 4, p 455-458, October-December 1973. 3 fig, 4 tab, 11 ref.

Descriptors: *Nitrates, *Leaching, *Water pollution control, *Sprinkler irrigation, Flooding, Denitrification, Organic soils, Water pollution sources, *Path of pollutants.
Identifiers: *Israel (Hula Valley).

Decomposition of organic matter in the drained soils of the Hula Valley, Israel, leads to the accumulation of nitrates. These are leached during the rainy season to the Jordan River and endanger Lake Kinneret. Field studies show that nitrates can be reduced through the use of the irrigation systems existing in the area. Either sprinkling or flooding by raising the water table reduced the nitrate concentration to about half of its original amount. Both treatments induced anaerobic conditions in the soil and reduced the nitrate contents, probably by dentrification. The efficiency of the reduction depends on the existence of labile organic substrates in the soil. (Knapp-USGS)
W74-02153

PLANT NUTRIENT CONCENTRATIONS IN RUNOFF FROM FERTILIZED CULTIVATED EROSION PLOTS AND PRAIRIE IN EASTERN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Soils.
E. M. White, and E. J. Williamson.
Journal of Environmental Quality, Vol 2, No 4, p 453-455, October-December 1973. 3 tab, 6 ref.

Descriptors: *Nutrients, Runoff, *Fertilizers, *Erosion, *Grasslands, Water pollution sources, *Path of pollutants, *South Dakota, Agriculture.

Runoff waters from fertilized erosion plots and from native prairie in South Dakota were compared to determine the effect agriculture has had on water quality. Calcium, Mg, K, Na, total P, PO4-P, NO3-N, and NH4-N contents were found to be similar in runoff from the erosion plots and from the prairie. The elemental contents in runoff from erosion plots planted to oats, corn, and alfalfa or fallowed were not distinctly different and varied from year to year. Variations in the ions in water collected from different basins in the prairie may be caused by differences in the prairie vegetation and mulch in the drainage basins, in the time the runoff has to dissolve ions because of different overland flow distances, and in the dilution of the runoff by precipitation that falls directly into the basin. Losses of plant nutrients in soil eroded from cultivated land may be similar to average losses that would occur naturally if the area were in pristine prairie that was periodically subjected to fire. (Knapp-USGS)
W74-02154

SIGNIFICANCE OF PH AND CHLORIDE CONCENTRATION ON BEHAVIOR OF HEAVY METAL POLLUTANTS: MERCURY (II), CADMIUM (II), ZINC (II), AND LEAD (II),
Soil and Irrigation Research Inst., Pretoria (South Africa).
H. C. H. Hahne, and W. Kroontje.
Journal of Environmental Quality, Vol 2, No 4, p 444-450, October-December 1973. 10 fig, 4 tab, 17 ref.

Descriptors: *Heavy metals, *Hydrolysis, *Chlorides, *Mercury, *Cadmium, *Zinc, *Lead, Solubility, Water pollution sources, Hydrogen ion concentration.
Identifiers: Complex ions.

The degrees to which Hg (II), Cd (II), and Pb (II) complex with hydroxyl and chloride ions were calculated to evaluate the significance of such complexation in natural systems. Both the hydroxy and chloride complexes may contribute to the mobilization of these heavy metal ions in the environment. Hydrolysis of Hg (II) becomes important at pH values above 1 whereas Pb (II), Zn (II), and Cd (II) hydrolyze above pH 5, 7, and 8, respectively. Chlorides complex with Hg (II) at chloride concentrations above 1 billionth M. Hydrolysis and chloride complexation of these heavy metal ions are important factors affecting the solubility of the sparingly soluble salts of these metal ions. This is most pronounced for mercuric salts. Intrinsic solubilities of the metal-ion hydroxides allow for 160 ppm Zn (II) and 107 ppm Hg (II) to be soluble as complexed Zn (OH)2 and Hg (OH)2, respectively. These values are higher than calculated solubilities based on solubility products. An example of the competition between hydroxy and chloride complexes shows that at pH 8.5 and a chloride concentration range of 350-60,000 ppm, Hg (II) and Cd (II) are mainly complexed by chlorides. Zn (II) and Pb (II), under these conditions, are predominantly in the form of hydroxy complexes. (Knapp-USGS)
W74-02155

EXPERIMENTAL AND PREDICTED MOVEMENT OF THREE HERBICIDES IN A WATER--SATURATED SOIL,
Oklahoma State Univ., Stillwater. Dept. of Agronomy.
J. M. Davidson, and J. R. McDougal.
Journal of Environmental Quality, Vol 2, No 4, p 428-433, October-December 1973. 7 fig, 1 tab, 19 ref.

Descriptors: *Path of pollutants, *Herbicides, *Saturated soils, Saturated flow, *Soil water movement, Pesticide kinetics, Dispersion, Adsorption.

The equilibrium asorption characteristics of 1,1-dimethyl-3- (a,a,a-trifluoro-m-tolyl) urea (fluometuron), 4-amino-3,5,6-trichlor-opicolinic acid (picloram), and 2,4-bis (isopropylamino)-6-(methylthio)-s-triazine (prometryne) on Ca-saturated Norge loam soil were measured and were found to fit the Freundlich equation. A solution of each herbicide was displaced through a water-saturated column of Norge loam soil at various average pore-water velocities (5.6 to 0.57 cm per hour) and effluent samples evaluated to determine the importance of adsorption kinetics to the mobility of the herbicide. The displacement of each herbicide through the soil was significantly influenced by the average pore-water velocity. The use of a kinetic adsorption model in a convective transport equation did not adequately predict the shape of the effluent concentration distribution at the high pore-water velocities, but did give the left-hand shift exhibited by the data. The tailing noted in all the herbicide effluent concentration distributions resulted primarily from the nonsingularity between the adsorption-desorption process. Equilibrium adsorption and desorption isotherms were measured for picloram on Ca-saturated Norge loam soil. (Knapp-USGS)
W74-02156

EFFECT OF FEEDLOT MANURE ON SOIL AND WATER QUALITY,
Department of Agriculture, Lethbridge (Alberta). Research Station.
T. G. Sommerfeldt, U. J. Pittman, and R. A. Milne.
Journal of Environmental Quality, Vol 2, No 4, p 423-427, October-December 1973. 3 fig, 4 tab, 19 ref.

Descriptors: *Farm wastes, *Nitrates, *Phosphorus, *Water pollution sources, *Feed lots, Soil water, Cattle, Water pollution effects, *Canada.

Research was conducted to determine the contribution of representative feedlots in semiarid southern Alberta to soil and water pollution and to determine the effect of long-term applications of manure on the N, P, and soluble salt content of cultivated soil under irrigation. The NO3-N and available P content of the surface soil adjacent to the feedlots was generally greater than that of the soil away from the feedlots, but at depths greater than 150 cm the differences were usually small. Similarly, the concentration of NO3-N and P in the groundwater at 1- to 5-m depths was usually increased only adjacent to the feedlot and, with minor exceptions, remained within safe limits most of the time. There was no evidence that a small lake or three permanent streams near feedlots were polluted by effluents from the feedlots. Manure applied annually for 40 years at a rate of 70 metric tons per ha did not cause an undesirable buildup of N, P, or soluble salts in the soil. (Knapp-USGS)
W74-02157

THE TURBULENT TEMPERATURE MIXING LAYER,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-02162

DISPERSION IN FLOW FROM A CONTINUOUS SOURCE AT SEA,
Liverpool Univ. (England). Dept. of Oceanography.
K. F. Bowden, and R. E. Lewis.
Water Research, Vol 7, No 11, p 1705-1722, November 1973. 9 fig, 6 tab, 21 ref.

Descriptors: *Dispersion, Diffusion, *Path of pollutants, Sea water, Dye releases, Dye dispersion, Fluorescent dye.
Identifiers: *Scotland (Holy Loch), Irish Sea.

Diffusion experiments, using a continuous release of fluorescent dye from an anchored source, were

carried out in the Holy Loch and two coastal areas of the Irish Sea. In each case the dye distribution was sampled by a vessel making a series of crossings of the plume. The data were analyzed in terms of the standard deviation of the dye distribution at right angles to the axis of the plume, as a function of the diffusion time, and the corresponding eddy diffusion coefficient. In general the diffusion coefficient increased with time up to a diffusion time of at least 2 h. In many cases the relation was approximately linear, corresponding to spreading with a constant diffusion velocity. The observed median values of diffusion velocity for the Holy Loch, Red Wharf Bay and the area of the Irish Sea off the Cumberland coast were 0.4, 1.1 and 1.4 cm per sec. The vertical diffusion was also analyzed, but in less detail, and other features of the plumes, including their variability, are discussed. In general the rates of diffusion in the Holy Loch are similar to those reported for the Great Lakes and for coastal sea areas with weak currents and high stability. In the two Irish Sea areas the diffusion rates are similar to one another but considerably greater than in the Holy Loch. (Knapp-USGS)
W74-02163

DETERMINATION OF THE MECHANICAL COMPATIBILITY OF POROUS ROCKS WITH WASTE WATER IN ITS SUBSURFACE DISPOSAL,
Ustredni Ustav Geologicky, Brno (Czechoslavakia).
M. Strnad, and D. Novotny.
Water Research, Vol 7, No 11, p 1599-1607, November 1973. 2 fig, 5 tab, 11 ref.

Descriptors: *Clogging, *Silting, *Injection wells, *Waste disposal wells, Porosity, Permeability, Particle size, Industrial wastes.

The effect of waste water suspended solids on the permeability of the disposal horizon may be determined on the basis of rock pore size distribution measurements made by means of a mercury pressure porosimeter. The results approach laboratory measurements for smaller particles, and for particles of 0.00075 cm radii they are practically coincident. The method is useful for economic calculations of surface facilities for waste water treatment. The method can also be applied to similar problems concerning the injection of water into wells for the purposes of secondary oil recovery (water flooding). (Knapp-USGS)
W74-02165

TWO ENVIRONMENTAL ANALYSES INVOLVING AGRICULTURE,
Illinois Univ., Urbana.
E. R. Swanson.
Paper presented at Ames, Iowa Workshop on Decision and Environmental Analysis held in connection with Computer Science and Statistics: Seventh Annual Symposium of the Interface, October 1973. 8 p, 2 fig, 15 ref.

Descriptors: Water quality act, *Small watersheds, *Farm wastes, *Simulation analysis, *Water reuse, *Linear programming, Optimal development plans, *Waste disposal, Watershed management, Sedimentation, Nitrates.
Identifiers: Municipal wastes disposal, Reclaimed strip mining.

Linear programming is used to analyze the impact of water quality constraints on optimal agricultural production in a small watershed. The constraints included rates of sedimentation and nitrate concentration. A second analysis deals with sludge disposal on reclaimed land. A simulation model identifies variables critical for effectiveness of the project.
W74-02166

AN INVESTIGATION OF THE PHYSICAL EFFECTS OF THERMAL DISCHARGES INTO CAYUGA LAKE,
Calspan Corp., Buffalo, N.Y.
T. R. Sundaram, C. C. Easterbrook, K. R. Piech, and G. Rudinger.
Technical Report, 74 fig, 9 tab, 141 ref, 306 p, November 1969.

Descriptors: Lakes, Powerplants, *New York, *Thermal pollution, Water pollution effects, *Lake stratification, Water pollution sources, Outlets.
Identifiers: *Cayuga Lake (N.Y.), *Thermal plume, Epilimnetic characteristics.

An analytical study of the physical effects of thermal discharges from power plants into a stratified lake are considered. Specifically, the possible physical consequences of the thermal discharges from a proposed nuclear power plant on the thermal structure of Cayuga Lake, New York are predicted. The effects of the thermal discharges are analyzed in two separate spacial and temporal scales. In the first scale, which is termed the near-field scale, the effects of the thermal discharges on the region in the immediate vicinity of the outfall are considered. The behavior of the thermal plume as a function of the changing meteorological conditions above the lake and as a function of the outfall configuration are discussed. The effects of the power-plant intake on the thermocline are also discussed. In the second scale, which is termed the far-field scale, the effects of the heated discharges on the thermal structure of the entire lake are considered. In particular, the effects of the discharges on the epilimnetic characteristics and the stratification period of the lake are given. The various transient motions (such as internal seiches) that occur in a stratified lake are also analyzed.
W74-02178

PERSISTENT SEA-FOAM MASSES — A PROBLEM SOLVED,
Calspan Corp., Buffalo, N.Y.
R. E. Baier.
Australian Natural History, p 162, March 1972.

Descriptors: Lakes, *Foaming, Water pollution control, Water pollution sources, *New York, Eutrophication, Frothing, Surfactants.
Identifiers: *Sea-Foam Masses, *Lake Chautauqua (N.Y.).

The curious nature of the great masses of foam, which are often found drifted in from the sea onto local rocks and beaches, was researched. It was observed that these lather-like masses persisted for relatively long periods, even when blown about by the wind. In Lake Chautauqua, the proteinaceous material was found to give rise in billowing heaps of foam along the windward shore, and to have its origin in a large algae bloom. An explanation of the phenomenon of foam formation could be that during storms, large numbers of planktonic organisms were destroyed and the debris from these minute organisms lowered the water surface tension to allow it to foam and stabilized the froth once it was formed.
W74-02180

SURFACE QUALITY ASSESSMENT OF NATURAL BODIES OF WATER,
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 05A.
W74-02181

CHEMISTRY OF MARINE NATURAL PRODUCTS,
Hawaii Univ., Honolulu. Dept. of Chemistry.
P. J. Scheuer.
Academic Press, New York, N.Y. 1973. 201 p.

Descriptors: *Organic compounds, *Chemistry, *Nitrogen compounds, Marine algae, Marine animals, Marine bacteria, Sea water, Amino acids, Nitrogen, Organic acids, Bioluminescence, Lipids, Phenols, Attractants, Poisons, Red tide, Sulfur compounds, Cyanophyta, Protozoa, Chlorophyta, Crustaceans, Invertebrates, Dinoflagellates, Pyrrophyta, Phaeophyta, Gastropods, Mollusks, Annelids, Snails, Clams, Rhodophyta, Copepods, Nematodes, Mammal groupings, Marine fish, Oysters, Lobsters, Coral, Marine plants, Diatoms, Chrysophyta.
Identifiers: *Isoprenoids, *Sterols, *Benzenoids, *Aliphatic hydrocarbons, *Marine environment, *Natural organics, *Chemical structure, Sesquiterpenoids, Diterpenoids, Triterpenoids, Carotenoids, Flavonoids, Biosynthesis, Naphthalene, Anthracene, Choline, Derivatives, Amines, Hydrocarbons, Fathy acids, Sponges, Antedon.

This publication is concerned with the naturally occurring organic compounds in the sea. Major emphasis has been placed on structural organic chemistry. (Holoman-Battelle)
W74-02189

ON THE RELATION BETWEEN THE OCCURRENCE OF DESMIDS AND THE SALINITY IN THE HOKURIKU DISTRICT OF JAPAN, (IN JAPANESE).
Nijo Junior High School, Kyoto (Japan).

Bull Jap Soc Phycol. Vol 20, No 3, p 101-110. 1972. Illus. (English summary).
Identifiers: Brackish water, Closterium-Parvulum, *Closterium-spp, Cosmarium-spp, *Desmids, *Japan (Hokuriku), *Salinity, Staurastrum-spp.

Five lakes and their rivers in the Hokuriku district of Japan were surveyed. The desmids of this district are composed of 5 genera and 53 spp., of which 51 belong to the genera Closterium, Cosmarium and Staurastrum. The desmids are widely distributed in fresh water, but few of them occur in brackish water of low salinity. Judging from the survey, their adaptable range chlorinity reached to 500 mg/l except that Closterium parvulum seems to tolerate about 1500 mg/l.--Copyright 1973, Biological Abstracts, Inc.
W74-02191

INFLUENCE OF SOIL STRUCTURE AND MOISTURE ON NITRIFICATION,
Komenskeho Universita, Bratislava (Czechoslovakia). Dept. of Microbiology.
For primary bibliographic entry see Field 02G.
W74-02192

CALCULATION OF DOSE CONVERSION FACTORS FOR 60CO GAMMA RADIATION IN WATER, (IN GERMAN),
International Atomic Energy Agency, Vienna (Austria).
H. H. Eisenlohr, and R. Abdelin-Zadeh.
Strahlentherapie. Vol 143, No 4, p 410-415. 1972. Illus. (English summary).
Identifiers: Calculations, *Cobalt-60, *Dose conversion, *Gamma radiation, Water pollution sources.

The dose conversion factors, f and g, and the water-air-ratio were calculated for 60Co gamma radiation and water as a ratio of the corresponding depth-doses. Results agreed with the recommended values. The dose conversion factors f and g, were independent of both depth in water and field size within the regions investigated.--Copyright 1973, Biological Abstracts, Inc.
W74-02198

SALT, A LITTLE-KNOWN AGGRESSOR IN OUR ENVIRONMENT, (IN FRENCH),
Neuchatel Univ. (Switzerland). Centre de Hydrogeologie.
B. Kubler.
Bull Soc Neuchatel Sci Nat. 95 p 133-163. 1972. Illus. (English summary).
Identifiers: Environmental effects, *Salts, *Switzerland.

The worldwide production and consumption of salt increases faster than the population. This translates into an encroachment on the environment. The salts resulting from industrial activity which attack the soil, the water and the atmosphere are, without doubt, the most serious, but they are easily detected. The daily or seasonal consumption by small non-industrial communities is alarming in its progress. This increase, which is almost logarithmic, is due to the rapid development of water-softener installations and to the salting of roads, which adds to the pollution already caused by automobiles. For example, in Switzerland, the consumption of deicing salt increased from 10,000 to 128,000 tons/yr between 1960 and 1970. If this progression were to continue, it would reach 1,200,000 tons by 1980. Therein lies the grave danger to the biotopes in rivers and lakes, the difficulties to be overcome by the water filtration plants and the problem of the drinking water supply.--Copyright 1973, Biological Abstracts, Inc.
W74-02199

AN ECOLOGICAL EVALUATION OF STREAM EUTROPHICATION,
Michigan State Univ., East Lansing. Inst. of Water Research.
For primary bibliographic entry see Field 05C.
W74-02201

THE USE OF POWER PLANT HEAT IN A PHYSICAL-CHEMICAL DOMESTIC WASTE-WATER RENOVATION SYSTEM,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
For primary bibliographic entry see Field 05D.
W74-02208

SOIL POLLUTION FROM CATTLE FEEDLOTS IN GEORGIA,
Georgia Univ., Athens. Dept. of Agronomy.
H. W. Fordham.
Available from NTIS as PB-226 083 $4.75 in paper copy, $1.45 in microfiche. M S Thesis, January 1973. 44 p, 9 fig, 10 tab, 34 ref. OWRR A-031-GA (2). 14-31-0001-3810.

Descriptors: *Feed lots, *Cattle, *Nitrates, Water pollution sources, *Farm wastes, *Georgia, Soil chemistry, Nutrients, Soil analysis.
Identifiers: *Goundwater pollution sources.

Soil samples were taken from 21 beef cattle feedlots in Georgia. Samples to 122 cm depth were taken upslope, within and approximately 30 and 90 m downslope from the lots. Soil samples were analyzed for extractable NO3, NO2, NH4, P, K, Ca, Mg, and for electrical conductivity, pH and organic matter. Soil nitrate was considerably less in the Georgia feedlots than in those in the more arid regions of the west and midwest. The average topsoil nitrate in feedlots was less than 20 ppm. Nutrients other than potassium did not show apprciable movement into the soil profile. It is concluded that pollution of ground water from beef cattle feedlots is probably not significant in Georgia. (Giddens-Georgia)
W74-02210

THE EFFECTS OF TRACE METALS ON GROUND WATER QUALITY AS INFLUENCED BY SOILS REFLECTING DIFFERENCES IN ORGANIC MATTER CONTENT AND GENETIC CONDITIONS,
Tuskegee Inst., Ala.
F. Ponder, Jr.
Available from the National Technical Information Service as PB-226 142, $5.50 in paper copy, $1.45 in microfiche. M.S., Thesis, May 1971. 61 p, 10 fig, 9 tab, 65 ref. OWRR B-028-Ala (4).

Descriptors: *Metals, *Zinc, *Absorption, *Organic soils, *Leaching, Soil chemistry, Water quality, Soil types, Acidic soils, Muck soils, Silts, Loam, Soil water movement, Percolation, Porosity, Drainage effects, Runoff, Ion transport, Chelation, Analysis, *Path of pollutants, Water pollution sources.

A review of literature on the correlation between organic matter and zinc content of soil and an investigation of zinc absorption using four different types of soil are presented. These soils were: Alaskan soil, a low humic glei soil with low pH and high in free iron oxides; muck, with a high pH and great amount of organic matter; Norfolk soil, loose, sandy, well-drained and well aerated; and Nebraska soil, which was a crofton silty clay loam. These soils, which were selected to represent a wide range of organic matter contents and genetic conditions, were prepared and submitted to studies of zinc adsorption and leaching. Soil and runoff water were analyzed for zinc content. The quantity of zinc absorbed by the soil increased as the organic content of the soil increased. Alaskan soil formed under very acid conditions absorbed less zinc than the muck soil. Potassium ions replaced large quantities of zinc from all the soils studied. It is concluded that organic matter is mainly responsible for the retention of zinc or other divalent metal by forming stable complexes. Groundwater having passed through soils high rather than low in organic matter will contain lesser quantities of divalent cations. (Jerome-Vanderbilt)
W74-02211

COMPUTER SIMULATION OF TROPHIC LEVEL INTERRELATIONSHIPS IN CAYUGA LAKE,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 05C.
W74-02216

EXPERIMENTAL STUDIES ON PHYTOPLANKTON SUCCESSION IN CAYUGA LAKE,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 05C.
W74-02217

THE QUANTITY AND DIMENSIONS OF MICROORGANISMS IN BOTTOM SEDIMENTS OF FISH-BREEDING PONDS (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
For primary bibliographic entry see Field 08I.
W74-02228

EFFECT OF A CINDER SETTLING TANK OF A THERMAL ELECTRIC POWER PLANT ON THE QUALITY OF SUBSURFACE WATERS, (IN RUSSIAN),
Municipal Sanitary-Epidemiological Center, Voroshilovgrad (USSR).
M. S. Burakhovich, A. S. Kolesnikov, and T. I. Ostrovskaya.
Gig Sanit. Vol 37, No 3, p 97-99. 1972.
Identifiers: *Cinder settling tanks, *Electric powerplants, Pollution, Subsurface water, *Thermal power, Water pollution sources, Settling basins.

The results of 15 yr observations showed that the cinder settling tank of a thermal electric power plant in the absence of waterproofing of its bed and in the presence of a hydrological link with subsurface waters serves as a source of their chemical pollution, expressed by an increase of salination of these waters.--Copyright 1973, Biological Abstracts, Inc.
W74-02231

USING THE ADSORPTION METHOD ON ACTIVATED CHARCOAL WITH CHLOROFORM EXTRACTION (CCE) FOR EVALUATING WATER POLLUTION BY ORGANIC SUBSTANCES, (IN RUSSIAN),
Permskii Politekhnicheskii Institut (USSR). Dept. of Sanitary Technology.
Ya. I. Visman, and S. Ya. Barikhin.
Gig Sanit. Vol 37, No 3, p 77-79. 1972.
Identifiers: Activated charcoal, Adsorption, *Charcoal-chloroform extraction, Evaluation, Methodology, *Organic wastes, *USSR, Water pollution sources, Reservoirs.

Experimental investigations were done from 1967-1970 for the purpose of using the charcoal-chloroform extraction (CCE) method for determining pollution in the Kama and Votkin reservoirs, USSR. The program included a quantitative measurement of water pollution by the CCE method, separation of the extracts into fractions, identification of the fractions, and isolation of individual components. An investigation of the extracts obtained permits not only differentiating individual water samples with respect to their degree of pollution by organic substances but also determining the qualitative composition of the pollutants.--Copyright 1973, Biological Abstracts, Inc.
W74-02232

EFFECT OF A CEMENT ANTICORROSION COATING ON THE QUALITY OF DRINKING WATER, (IN RUSSIAN),
Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).
A. G. Ilichkina.
Gig Sanit. Vol 37, No 3, p 110. 1972.
Identifiers: *Cement, Coatings, *Corrosion control, Water quality standards, *Potable water.

A study of the effect of fine-grained Portland cement in the form of slabs submerged in water on the quality of water showed that the organoleptic and physicochemical properties of the water deteriorate. After preliminary decontamination of the slabs with active Cl and subsequent washing these changes were less pronounced but with long contact the water quality did not meet the standards for drinking water.--Copyright 1973, Biological Abstracts, Inc.
W74-02233

RELATION OF MINERAL AND HORMONE METABOLISM TO INTAKE OF WATER WITH A HIGH NATURAL CONTENT OF FLUORIDE,
L.L.R.M. Medical Coll., Meerut (India). Dept. of Pathology.
For primary bibliographic entry see Field 05C.
W74-02235

OCCURRENCE OF SAPROCHAETE SACCHAROPHYLA COKER ET SHANOR IN FUNGOID GROWTH BELOW THE DISCHARGE OF BREWERIES, (IN CZECH),
J. Hauslerova.
Ceska Mukol. Vol 26, No 4, p 233-237. 1972. Illus. (English summary).
Identifiers: *Breweries, Classification, Ecological studies, *Fungoid growth, Fusarium-Aqueductuum, Geotrichum-Candidum, Helicocephalum-Sp, Leptomitus-Lacteus, Mucro-Fragilis, Mucor-Globosus, Rhizopus-Nigricans, *Saprochaete-Saccharophyla, Seasonal, Industrial wastes, *Czechoslavakia (Bohemia).

Downstream of the waste water outflow from the brewery at Vysoky Chlumec (Bohemia, Czechoslovakia) a considerable growth of fungi filaments is ascertained throughout the year. The permanent investigation of this growth, from April 1970 to Feb. 1971, revealed that their composition is almost stable. The following species were observed: Fusarium aquaeductuum (Rad. et Rabenh.) Sacc., Leptomitus lacteus (Roth) Agardh, Geotrichum candidum Link ex Pers., Rhizopus nigricans Ehrenb., Mucor globsus Fisch., M. fragilis Bain., Helicocephalum sp., and Saprochaete saccharophyla Coker et Shanor, which during the period between Sept. 1970 and Jan. 1971 were found in large quantities. The systematical inclusion of S. saccharophyla still remains an open question. The occurrence of this organism is mentioned mostly in wastes and highly polluted waters, and so it can be considered as a member of the biocenose of polluted waters.--Copyright 1973, Biological Abstracts, Inc.
W74-02242

EFFECT OF HEATED WATER FROM KONAKOV HYDRO-ELECTRIC STATION ON OXYGEN CONTENT AND DEVELOPMENT OF PHYTOPLANKTON IN IVAN'KOVSKOE RESERVOIR DURING WINTER, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
T. N. Kurdina, and V. G. Devyatkin.
Gidrobiol Zh. Vol 8, No 4, p 75-80. 1972. Illus.
Identifiers: Algae, Diatoms, *Heated water, *Hydro electric powerplant, Oxygen, Phytoplankton, Reservoirs, *USSR (Konakov), Winter, *Cyanophyta, *Chlorophyta, Termal pollution.

The discharge of heated water from the Konakov Hydroelectrical Station (USSR) created areas of increased temperature and oxygen content in the reservoir. The number of phytoplankton, including diatoms, green and blue-green algae, increased in heated and aerated waters. The number of species also increased, due mainly to increased numbers of diatoms. These indices can be used to determined the distribution of discharge water.--Copyright 1973, Biological Abstracts, Inc.
W74-02244

ON THE VARIATION OF SALINITY DISTRIBUTION IN A RESERVOIR, SITUATED IN RECLAIMED LAND, (JAPANESE),
Saga Univ. (Japan). Lab. of Shore Reclamation.
For primary bibliographic entry see Field 02H.
W74-02246

THE ABILITY OF BACTERIA TO MINERALIZE ALGAE ORGANIC MATTER, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
V. M. Kudryavtsev.
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
Identifiers: *Algae organic matter, Aphanizomenon, Bacillus, *Bacterial decomposition, Bacterium, Micrococcus, Microcystis, Mycobacterium, Pseudomonas, Sarcina, Scenedesmus-Quadricauda, *USSR (Kaibyshev reservoir), *Mineralization.

The bacterial decomposition of cells of Scenedesmus quadricauda and the biomass of phytoplankton found on the Kuibyshev water reserve, where algae of Aphanizomenon and Microcystis predominate was studied. Strains (15) of pure cultures were also used from Pseudomonas, Bacterium, Bacillus and Sarcina, Micrococcus and Mycobacterium families in order to determine the organic carbon content of algae. Bacterial oxidation of S. quadricauda varied 17-36%, while the organic content of phytoplankton varied by 50-67%. In a mixture of all bacteria, the results were 27.4% and 51.6% which was close to lake content of 25.3% and 51.5%.--Copyright 1973, Biological Abstracts, Inc.
W74-02252

MICROFLORA AND CHEMICAL COMPOSITION OF THE BOTTOM DEPOSITS OF THE KAIRAK-KUM RESERVOIR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSSR, Dushanbe. Institut Zoologii i Parazitologii.
N. I. Bogdanov.
Izv Akad Nauk Tadzh SSSR Otd Biol Nauk. 2 p 42-46. 1972, Illus.
Identifiers: *Bottom deposits, *Chemical composition, Flora, Reservoirs, *USSR (Kairak-Kum reservoir), *Bacteria.

The organic content and total number of bacteria in the bottom deposits of the Kairak-Kum (USSR) reservoir was studied. Chemical and microbiological analysis showed that the paucity of benthos of this reservoir is related to the low organic content and microflora of the bottom deposits.--Copyright 1973, Biological Abstracts, Inc.
W74-02253

PROBLEMS WITH COLORED PAPERS: ARE THEY A CAUSE OF POLLUTION, (PROBLEME MIT FARBIGEN PAPIEREN: SIND SIE EINE URSACHE VON VERSCHMUTZUNG),
W. Schweisheimer.
Der Papiermacher, Vol 21, No 8, p 117-118, August 5, 1972.

Descriptors: *Water pollution sources, *Pulp wastes, Color, *Dye releases, Toxicity, Pulp and paper industry, Industrial wastes, *Biodegradation, Dyes.
Identifiers: Tissue papers, Facial tissues, Toilet tissues, *Colored paper.

The manufacture of colored paper products, such as toilet and facial tissues of various shades and hues, is discussed in relation to the biodegradability of the dyestuffs used and discharged with the paper machine effluent (white water). Studies of the chemical and toxicological properties of various dyes led to the belief that the dyeing of papers does not add materially to the water pollution problems of the paper industry. (Speckhard-IPC)
W74-02255

CHARACTERIZATION AND TREATMENT OF FISH PROCESSING PLANT EFFLUENTS IN CANADA,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 05D.
W74-02262

EFFLUENT TREATMENT AT MAN-MADE FIBRE PRODUCTION UNITS,
Courtaulds Ltd., Coventry (England). Research Div.
For primary bibliographic entry see Field 05D.
W74-02263

MIGRATION OF SUBSTANCES WITH SURFACE AND GRAVITATIONAL WATERS IN SOILS OF GEOCHEMICALLY RELATED LANDSCAPES OF BARABA, (MIGRATSIYA VESHCHESTV S PVERKHNOSTNYMI I GRAVITATSIONNYMI VODAMI V POCHVAKH GEOKHIMICHESKI SOPRYAZHENNYKH LANDSHAFTOV BARABY),
Akademiya Nauk SSSR, Moscow. Pochvennyi Institut.
For primary bibliographic entry see Field 02G.
W74-02300

FIELD TESTS ON TRANSVERSE MIXING IN RIVERS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
E. R. Holley.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10241, p 2313-2331, December 1973. 14 fig, 2 tab, 11 ref, append.

Descriptors: *Mixing, *Diffusion, *Dispersion, *Path of pollutants, Waste disposal, Rivers, Streamflow, Jetties, Groins (Structures).

Five tests were made on transverse mixing in rivers. The transverse turbulent diffusion coefficient, averaged over long flow distances, was as much as three times larger than the value for an equivalent straight rectangular flume. This increase is due to the additional mixing associated with the protective groins which were present and with the helical motion resulting from channel bends. Net transverse velocities exist in rivers and can cause the local rates of transverse spreading to be significantly different from the rate associated with the average diffusion coefficient. Recommendations are given for conditions to be met in order to obtain meaningful data from field tests on rates of transverse diffusion in rivers. (Knapp-USGS)
W74-02318

THE EFFECTS ON RUNOFF, GROUNDWATER, AND LAND OF IRRIGATING WITH CATTLE MANURE SLURRIES,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05D.
W74-02326

CONTRIBUTION OF DEVELOPED AND NATURAL MARSHLAND SOILS TO SURFACE AND SUBSURFACE WATER QUALITY,
Wisconsin Univ., Madison. Dept. of Soil Science.
N. A. Isirimah, and D. R. Keeney.
Available from the National Technical Information Service as PB-226 071, $4.00 in paper copy, $1.45 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, September 1973. 30 p, 9 tab, 1 fig, 44 ref. OWRR A-049-WIS (1). 14-31-0001-3850.

Descriptors: *Organic soils, *Wetlands, *Marshlands, *Nitrogen, *Phosphorus, *Wisconsin, Water quality.
Identifiers: *Wingra watershed (Wis), Histosoils, Transformations.

Preliminary qualitative estimates of the role of natural and developed marshland soils as a nitrogen or phosphorus source or sink were obtained by a limited ground and surface water survey of a marsh adjacent to Lake Wingra, near Madison, Wisconsin and by laboratory investigations of nitrogen and phosphorus transformations in soil samples from this marsh and from an acid bog in northern Wisconsin. Results are presented on the rates and pathways of these transformations. The results indicate that the marsh does not act as a significant nutrient sink. Thus while removal of the marsh by draining or filling might result in more N and P entering the lake, its presence does not appear to be a factor in lowering lake productivity. Nutrient input into the lake probably could be lowered by discharging storm sewers on mineral soil rather than on the marsh.
W74-02327

WATER QUALITY CHARACTERISTICS OF STORM SEWER DISCHARGES AND COMBINED SEWER OVERFLOWS,
Illinois State Water Survey, Urbana.
V. Kothandaraman.
Circular 109, 1972. 19 p, 1 fig, 7 tab, 49 ref.

Descriptors: *Water pollution sources, *Outfall sewers, *Urban runoff, *Reviews, *Combined sewers, *Water quality, Separated sewers, Storm runoff, Storm water, Waste water treatment, Costs, Litter, Water pollution control, Pollutants, Heavy metals.

A study of the pollution from combined and separate storm sewers was made by reviewing pertinent case studies. A total of 49 references describing the quality characteristics of urban stormwater runoff were searched, with particular reference made to 25 of these studies. Suspended solids, volatile suspended solids, COD, BOD, total nitrogen, total phosphorus, and total coliform were compared for combined sewers, separate storm sewers, and raw sewage. Weibel, et al, (1966) found in studies in Cincinnati that separate storm runoff (annually) had the following loads as a percentage of raw sewage: suspended solids-160 percent, COD-33 percent, BOD-7 percent, total phosphate-5 percent and total nitrogen-14 percent. The American Public Works Association found that dirt and dust in street litter caused the most significant amount of pollution and varied from 0.4 to 5.2 pounds per day per 100 feet of curb. Proper street maintenance could minimize the pollutional effect of this material. Several mathematical models have been proposed to predict pollution of urban runoff. Two different models are described. Other studies have pointed out the effect of runoff pollution on streams and lakes. The estimated costs of solving pollution problems from urban runoff are given for various methods. Included are separation of sewers, chlorination, storage of water for later treatment, lagoon treatment, stream flow augmentation, and overflow treatment by grit chambers, settling tanks, and other methods. (Poertner)
W74-02345

GROUNDWATER EXPLORATION AND PROVISION FROM THE HYDROGEOLOGICAL POINT OF VIEW,
Bundesanstalt fuer Bodenforschung, Hanover (West Germany).
For primary bibliographic entry see Field 04B.
W74-02353

WATER QUALITY MANAGEMENT IN GROUNDWATER BASINS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
A. K. Tyagi.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 46 p, 71 ref.

Descriptors: *Groundwater, *Water quality, *Saline water intrusion, Encroachment, Coasts, Southwest U.S., Mixing, Saline water, Salinity, Sea water, Water pollution effects, Waste water (Pollution), Pollutants, *Waste water disposal, Waste disposal wells, Saline water-freshwater interfaces.
Identifiers: *Mexico (Sonora).

Oceanic and connate waters, irrigation return flows, fertilizers, disposal of saline waters by deep injection wells, lagoons and playas, and disposal of mine wastes are the sources of groundwater contamination in coastal and inland aquifers. Hydrodynamics of the phenomena of saline water intrusion from various causes is discussed. The status of intrusion in forty of the states in the U.S. and in six other countries is reviewed with emphasis on Arizona, California, New Mexico, and Israel. A special example of sea water intrusion in the Hermosillo coastal aquifer in arid northwestern Mexico is presented. Significant research developments and progress underway for analyzing the formation and maintenance of the transition zone between fresh and salt waters are also presented with special attention to the need for proper recognition of physical situations producing contamination so the problems can be avoided rather than discovered too late. (Muller-Arizona)
W74-02356

SOME CHEMICAL AND BIOLOGICAL CHARACTERISTICS OF THE MISSISSIPPI RIVER BORDERING IOWA,
Iowa Univ., Iowa City.
D. B. McDonald.
In: Water-1972, AIChE Symposium Series No 129, Vol 69, 1973, p 380-372. 1 tab, 3 ref.

Descriptors: *Mississippi River, *Water quality, *Freshwater fish, *Aquatic habitats, *Water pollution effects, Alkalinity, Biochemical oxygen demand, Calcium, Carbonates, Bicarbonates, Chemical oxygen demand, Chlorides, Fluorides, Hardness (Water), Nitrogen, Magnesium, Manganese, Ammonia, Nitrates, Hydrogen ion concentration, Phosphates, Potassium, Dissolved solids, Suspended solids, Silica, Sulfates, Specific conductivity, Industrial wastes, Domestic wastes, Agricultural runoff, Nutrients, Sphaerotilus, Orthophosphates, Pesticides, Fertilizers, Dissolved oxygen, Water pollution sources.

The portion of the Mississippi River which borders Iowa contains a variety of habitats, such as main channel, off-channel, lake, and slough areas, which support a wide variety of fish of sport and commercial significance. Over 50 species were identified in pool 14 alone. Studies of the water chemistry indicate that the water quality is good compared to streams within the state although there are limited stretches of river where deteriorated water quality conditions occur. Pollutants may also be introduced into the river as a result of runoff from agricultural land. Oxygen concentrations are usually adequate for fish life; however, low dissolved oxygen levels have been observed in slough areas accompanying the death and decay of large algal masses. (Little-Battelle)
W74-02363

DISTRIBUTION OF CAESIUM-137 IN BRITISH COASTAL WATERS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
D. F. Jefferies, A. Preston, and A. K. Steele.
Marine Pollution Bulletin, Vol 4, No 8, p 118-122, August 1973. 4 fig, 2 tab, 13 ref.

Descriptors: *Distribution patterns, *Radioactive wastes, Coasts, Water analysis, Sea water, Waste dilution, Separation techniques, Industrial wastes, Path of pollutants, Monitoring, Water pollution sources, Water pollution effects, Nuclear reactors, Nuclear wastes.
Identifiers: *Cesium-137, *Gamma spectrometry, Irish Sea, North Sea, North Channel, Sample preparation.

Water samples were collected from the Irish Sea, the northeast Atlantic, Scottish coastal waters, and the North Sea for analysis of Cs-137 emanating from the Windscale nuclear fuel reprocessing plant for the purpose of determining distribution patterns and dilution of this effluent. Cs-137 was determined by filtering seawater through a 0.22-millimicron membrane filter using one-step separation with either ammonium dodeca-molybdophosphate or potassium cobaltihexacyanoferrate followed by gamma spectrometry. More than 90 percent of the total cesium was retained in the filtrate. The data suggest that water leaving the Irish Sea through the North Channel moves round the coastline in a clockwise direction closely confined to the coastal margins of Scotland and then enters the northern North Sea, where its southern penetration may be detected as far south as the northern coast of England. This type of distribution has far-reaching implications for the fate of materials introduced to coastal waters since even Cs-137, which is relatively conservative in seawater, is largely confined in its distribution to inshore waters. Those materials which are less conservative and thus more rapidly removed from the water mass will be even more restricted in their distribution as a consequence. These general conclusions confirm the need to concentrate monitoring and surveillance operations in coastal waters, since the majority of pollutants are introduced regularly and in largest quantity at or near the shoreline. (Little-Battelle)
W74-02365

SEASONAL CHANGES IN THE ORGANIC FORMS OF CARBON, NITROGEN AND PHOSPHORUS IN SEA WATER AT EL IN THE ENGLISH CHANNEL DURING 1968,
Southampton Univ. (England). Dept. of Oceanography.
M. W. Banoub, and P. J. leB. Williams.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 3, p 695-703, August 1973. 6 tab, 26 ref.

Descriptors: *Water analysis, *Seasonal, *Carbon, *Nitrogen, *Phosphorus, *Sea water, Separation techniques, Colorimetry, Ammonia, Chlorophyll, Organic matter, Storage.
Identifiers: *English Channel, Dissolved organic carbon, Sample preparation, Infrared spectrophotometry, Organic nitrogen, Ultraviolet spectrophotometry, Orthophosphates, Sample preservation, Particulate matter.

Water samples were collected at monthly intervals during 1968 at Station El in the English Channel for analysis of organic C, N, and P to determine seasonal variations. Two aliquots from each sample were filtered for particulate N and C analysis through two glass fiber filters, one for analysis of organic C and one for organic N. The filtrate was frozen in clean bottles until analysis. The filters were washed with K2SO4 and H2SO4 to remove inorganic carbonates and stored in solid CO2. Particulate organic C was measured by infrared analysis of CO2 formed by combustion. Particulate N was measured by Kjeldahl combustion followed by colorimetric determination of ammonia by conversion to indophenol blue. Dissolved organic C was analyzed by the method of Menzel and Vaccaro (1964), total N and P were determined by uv irradiation; and chlorophylls were determined according to the recommendations of the SCOR/UVESCO report (1966). The average integral mean values were: dissolved organic carbon, 780 micrograms C/1; dissolved organic nitrogen, 64 micrograms N/1; dissolved organic phosphorus, 3.8 micrograms P/1. Dissolved organic carbon and the particulate organic carbon and nitrogen showed increases subsequent to the spring bloom; such increases were less evident in the dissolved organic nitrogen results and not apparent in those of dissolved organic phosphorus. (Little-Battelle)
W74-02369

DISSIPATION AND PHYTOTOXICITY OF DICAMBA RESIDUES IN WATER,
Texas A and M Univ., College Station. Dept. of Range Science.
C. J. Scifres, T. J. Allen, C. L. Leinweber, and K. H. Pearson.
Journal of Environmental Quality, Vol 2, No 2, p 306-309, April/June 1973. 3 fig, 3 tab, 17 ref.

Descriptors: *Pesticide kinetics, *Pesticide toxicity, *Phytotoxicity, Water pollution effects, *Pesticide residues, Environmental effects, Chlorinated hydrocarbon pesticides, Water analysis, Pollutant identification, Water pollution sources, Laboratory tests, Resistance, Plant growth, Bioassay, Persistence, Volatility, Soil contaimination, Path of pollutants, Herbicides, Water pollution, Microbial degradation, Water sampling.
Identifiers: *Dicamba, *Seedling crops, Dissipation, Fate of pollutants, Data interpretation, Banvel, Gas liquid chromatography, Cucumbers.

A study was conducted to evaluate (1) the influence of several environmental factors on dicamba dissipation from water, and (2) the biological significance of dicamba residues in water rela-

tive to growth and development of several crop species. Two south-central Texas ponds (only one was vegetated) were surface-sprayed with the dimethylamine salt of dicamba, and samples were taken and analyzed at 1, 3, 5, 7, 12, 15 and 20 days after treatment and thereafter at about 7-day intervals for an additional 70 days. Dicamba dissipation was studied under controlled greenhouse conditions using polyethylene containers under fluorescent lights. Dicamba concentrations in field samples were estimated using mustard seedling bioassay, spectrophotometric, and GLC techniques. Three greenhouse studies were conducted to evaluate seedling response of several crops to preemergence irrigation with water containing the herbicide. The herbicide dissipated most rapidly from water under non-sterile, lighted conditions. Pond sediment evidently contained microbial populations capable of decomposing the herbicide. Temperature was crucial in dicamba dissipation, especially in the presence of sediment. Influence of sediment on dissipation rate of dicamba was apparently augmented by light in some cases. Under summer conditions, dicamba at 4.4 kg/ha per surface area of ponds dissipated at about 1.3 ppm/day. Dicamba dissipated as a logarithmic function of concentration with time. Reaction of seedling crops to irrigation water containing dicamba varied among species and cultivars. Relative tolerance from these studies was ranked from most to least tolerant as follows: sorghum greater than cotton greater than cucumbers. (Holoman-Battelle)
W74-02370

CHLORODIOXINS IN PESTICIDES, SOILS, AND PLANTS,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
C. S. Helling, A. R. Isensee, E. A. Woolson, P. D. J. Ensor, and G. E. Jones.
Journal of Environmental Quality, Vol 2, No 2, p 171-178, April/June 1973. 1 fig, 2 tab, 39 ref.

Descriptors: *Soil contamination, *Vegetation, *2 4 5-T, *Pesticide kinetics, *Toxicity, Water pollution sources, Persistence, Volatility, Absorption, Translocation, Pesticides, Plant tissues, Organic pesticides, Soils, Chemical analysis, Soil analysis, Wastes, Herbicides, Chlorinated hydrocarbon pesticides, Phenolic pesticides, 2 4-D, Herbicides, Fungicides, Acaricides, Insecticides.
Identifiers: *Chlorodioxins, Toxicology, *Pesticide formulations, Impurities, Chlorodibenzo-p-dioxins, Teratogenicity, Photodecomposition, Nitrofen, Volatilization, Chlorinated hydrocarbons, Dicamba, Trichlorophenol, Tetrachlorophenol, Pentachlorophenol, 2 4-DB, 2 4-DEP, Dichlorprop, Erbon, Sesone, Silvex, DMPA, Hexachlorophene, Ronnel.

Chlorodioxins, such as 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (TCDD), are highly toxic impurities found in certain pesticides. A review is made of (1) the sources and toxicology of TCDD and its relationship to the herbicide 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), and (2) pesticide analyses and soil-related environmental studies of TCDD conducted by the U. S. Department of Agriculture. TCDD was persistent and immobile in soils. The dioxin was not detected, however, 6 years after abnormally high applications of 2,4,5-T to Lakeland sand. TCDD was not photodegraded on soil and only slightly, in aqueous suspension. Plants grown in soil containing 0.06 ppm TCDD had no detectable quantity (less than or equal to 1 ppb) at maturity. It was not translocated when applied to leaves, but washoff or volatilization occurred. TCDD was undetected (less than 50 ppb) in 19 bald eagle (Haliaeetus leucocephalus) carcasses. (Holoman-Battelle)
W74-02371

COMPLEX BEHAVIOUR OF COBALT IN THE DANUBE RIVER,
Institut za Nuklearne Nauke Boris Kildric, Belgrade (Yugoslavia).
R. Radosavljevic, T. Tasovac, R. Draskovic, M. Zaric, and V. Markovic.
Archiv fur Hydrobiologie, Suppl. 44, No 2, p 241-248, March 1973. 2 fig, 6 tab, 14 ref.

Descriptors: *Cobalt, *Bottom sediments, *Plankton, *Suspended solids, *Path of pollutants, Hydrobiology, Aquatic animals, Water pollution, Chemical analysis, Trace elements, Heavy metals, Cobalt radioisotopes, Pollutants, Absorption, Water analysis, Algae, Caddisflies, Gastropods, Clams, Oligochaetes, Mollusks, Mussels, Snails, Ion exchange, Fish, Soil analysis.
Identifiers: *Danube River, Transport, Chemical concentration, Bioaccumulation, Animal tissues, Co-60, Sava River, Tisa River, Luganer See River, Unter See River, Zuger See River, Vierwaldstatter See River, Biological materials, Leeches, Alburnus alburnus, Ion exchange capacity.

As a part of a program for investigating the pollution of the Danube and studying the behaviour of different pollutants introduced in the river, systematic investigations of the content of Cobalt-60 and inactive isotope have been carried out and their concentrations in water, suspended material, bed sediments, plankton and other components determined. The capture of cobalt by suspended particles and bed sediments has been studied. The behaviour of cobalt in the Danube River is complex and depends on many parameters. The interdependences between the content of cobalt in water and dispersed components in the river, biomaterials, macro-and microchemical elements indicate that biogeochemical transport in the river is very heterogenous and depends on hydrodynamical conditions. The empirical curves of cumulative frequency distributions of particular levels of cobalt in the cross-section of the river at the kilometer 1144 and 1137 have log-normal distributions and confirm that hydrodynamical conditions in the river play an important role in transport of cobalt. Results of field and laboratory experiments are presented. (Holoman-Battelle)
W74-02373

ACCUMULATION OF FOSSIL CO2 IN THE ATMOSPHERE AND THE SEA,
Institute of Nuclear Sciences, Lower Hutt (New Zealand).
For primary bibliographic entry see Field 05C.
W74-02375

THE FORMATION OF WATER-IN-OIL EMULSIONS SUBSEQUENT TO AN OIL SPILL,
Nova Scotia Technical Coll., Halifax. Dept. of Chemical Engineering.
G. D. M. MacKay, A. Y. McLean, O. J. Betancourt, and B. D. Johnson.
Journal of the Institute of Petroleum, Vol 59, No 568, p 164-172, July 1973. 5 fig, 3 tab, 19 ref.

Descriptors: *Oil spills, *Chemical properties, Oil-water interfaces, Stability, Emulsifiers, Chemical analysis, Mass spectrometry, Isolation.
Identifiers: *Water-in-oil emulstions, *Emulsification, *Asphaltenes, *Crude oil, Stabilizing agent, Gas, Oil, Naphtha, Asphalt.

A series of experiments were carried out to obtain more information on the extremely stable water-in-oil emulsions formed when some hydrocarbon products are spilled at sea. It was established that the agent responsible for the stability was not a discrete chemical entity but was an asphaltenic type substance. The mechanism resulting in the stabilizing effect does not involve electrical double layer interaction, but is due to the mechanical strength of the asphaltenic layer encapsulating each water droplet. (Holoman-Battelle)
W74-02377

PHOTOLYSIS OF PARATHION (O,O-DIETHYL-O- (4-NITROPHENYL) THIOPHOSPHATE). NEW PRODUCTS,
Miami Univ., Oxford, Ohio. Hughes Labs.
J. R. Grunwell, and R. H. Erickson.
Journal of Agricultural and Food Chemistry, Vol 21, No 5, p 929-931, September/October 1973. 1 fig, 1 tab, 13 ref.

Descriptors: *Aqueous solutions, *Pollutant identification, Phosphothioate pesticides, Degradation (Decomposition), Irradiation, Organophosphorus pesticides, Pollutants, Environmental effects.
Identifiers: *Photolysis, *Parathion, *Degradation products, *Paraoxon, Photodecomposition, Triethylphosphate, O O O-triethylthiophosphate, O O S-triethylthiophosphate, Ethanol, Tetrahydrofuran, Mass spectra, Infrared spectra, Gas liquid chromatography.

Solutions of parathion and paraoxon were irradiated at 2537 A for varying amounts of time and for 6 hr, respectively, in order to identify the photolytic products. Photoproducts were identified by gas liquid chromatographic retention time, mass spectra, and infrared spectrum and by comparison with an authentic sample. O,O,S-Triethylthiophosphate was identified as the major product of the photolysis of parathion in aqueous THF or ethanol. Minor products were O,O,O-triethylthiophosphate, paraoxon, and triethylphosphate, which was formed by secondary photolysis of paraoxon. (Holoman-Battelle)
W74-02380

PERSISTENCE OF ENDOTHALL IN AQUATIC ENVIRONMENT AS DETERMINED BY GAS--LIQUID CHROMATOGRAPHY,
Syracuse Univ. Research Corp., N.Y. Life Sciences Div.
H. C. Sikka, and C. P. Rice.
Journal of Agricultural and Food Chemistry, Vol 21, No 5, p 842-846, September/October 1973. 3 fig, 1 tab, 9 ref.

Descriptors: Persistence, *Pesticide kinetics, *Aquatic environment, *Pesticide residues, *Radioactivity techniques, Herbicides, Water analysis, Hydrosols (Soils), Soil analysis, Aquaria, Pollutant identification, Gas chromatography, Aquatic soils, Chemical analysis, Farm ponds, Path of pollutants, Water sampling, Bottom sampling, Time, Methodology, Organic pesticides.
Identifiers: *Endothall, *Gas liquid chromatography, Fate of pollutants, Chemical recovery, Detection limits, Sample preparation, Thin layer chromatography.

A gas chromatographic method was used to determine the residues of endothall in both the water and hydrosoil of a farm pond and of laboratory aquaria. The bulk of endothall added to the aquaria remained in the water during the course of the experiment. Both in the pond and in the aquaria, the herbicide persisted in the hydrosoil for a longer period than in the water. In the pond treated with approximately 2 ppm of endothall, the herbicide could not be detected in the water and top 1 in. of the hydrosoil 36 and 44 days after treatment, respectively. In the aquaria treated with 2 and 4 ppm, endothall was reduced to nondetectable levels in the water within 7 days after treatment. It took 2 and 4 weeks for the herbicide in the hydrosoil to reach a level of less than 0.1 ppm in the aquaria treated with 2 and 4 ppm, respectively. The rate of endothall dissipation in the aquaria was similar at both application rates. (Holoman-Battelle)
W74-02381

RATES AND PRODUCTS OF DECOMPOSITION OF 2,2-DIBROMO-3-NITRILOPROPIONAMIDE,
Dow Chemical Co., Midland, Mich. Halogens Research Lab.
J. H. Exner, G. A. Burk, and D. Kyriacou.

Journal of Agricultural and Food Chemistry, Vol 21, No 5, p 838-842, September/October 1973. 3 fig, 4 tab, 19 ref.

Descriptors: *Microbial degradation, *Hydrolysis, *Pesticide kinetics, Environmental effects, Hydrogen ion concentration, Temperature, Chemical analysis, Pollutant identification, Soil contamination, Water pollution, Degradation (Decomposition), Bactericides, Chemical reactions, Carbon dioxide, Ammonia, Bromides, Polarographic analysis, Soil microorganisms, Halogenated pesticides, Organic pesticides, Water analysis, Aqueous solutions.
Identifiers: *Degradation rates, *Degradation products, Biocides, Nucleophiles, *Photodecomposition, 2 2-Dibromo-3-nitrilopropionamide, Fate of pollutants, Photolysis, Dibromoacetonitrile, Dibromoacetamide, Dibromoacetic acid, Glyoxylic acid, Oxalic acid, Sodium bisulfite, Cyanoacetamide, Sample preparation, Amides.

Rates and products of decomposition of 2,2-dibromo-3-nitrilopropionamide (DBNPA), an antimicrobial compound for industrial water treatment, were determined over a range of conditions. Rates of hydrolytic decomposition, determined polarographically at various pH's and temperatures, are consistent with acid- and base-catalyzed amide hydrolysis. Hydrolysis of DBNPA ultimately forms carbon dioxide, ammonia, and bromite ions via the following sequence of degradation products: dibromoacetonitrile, dibromoacetamide, dibromoacetic acid, glyoxylic acid, and oxalic acid. DBNPA reacts rapidly with various ions such as bisulfite to form cyanoacetamide. Decomposition under the influence of sunlight also leads to cyanoacetamide. Contact with soil and soil organisms degrades DBNPA. Decomposition of DBNPA by several chemical and biological pathways ensures that the compound will not persist in the environment. (Holoman-Battelle)
W74-02382

PICLORAM PHOTOLYTIC DECOMPOSITION,
Agricultural Research Service, Fort Collins, Colo.
A. R. Mosier, and W. D. Guenzi.
Journal of Agricultural and Food Chemistry, Vol 21, No 5, p 835-837, September/October 1973. 2 fig, 2 tab, 16 ref.

Descriptors: *Aqueous solutions, *Chemical analysis, *Radioactivity techniques, *Pollutant identification, Chlorinated hydrocarbon pesticides, Path of pollutants, Degradation (Decomposition), Herbicides, Gas chromatography, Irradiation, Separation techniques, Chemical reactions, Halogenated pesticides, Organic pesticides.
Identifiers: Fate of pollutants, *Picloram, *Photodecomposition, Quantitative analysis, Electron capture gas chromatography, Thin layer chromatography, Degradation products, Degradation pathway, Silver/silver chloride electrode, Scintillation counting, Decarboxylation.

Irradiation of a 0.00208 M aqueous solution of the picloram sodium salt with 300-380 nm ultraviolet light resulted in 99 percent degradation of the parent compound within 72 hr. After 5, 15, 25, 34, and 48 hr of irradiation, the amounts of picloram degradation were 15, 27, 31, 61, and 90 percent, respectively (all picloram solutions were analyzed as the methyl ester, solutions were methylated by diazomethane). After 34 hr of irradiation, 11 visually observable degradation products, excluding the spot of origin (spot no. 1) and parent compound (spot no. 13), were separated by tlc. Eight of these spots had radioactivity above background, which indicated that the carboxyl carbon (C-14) was still intact. No radioactivity was detected in the other three compounds, spots 5, 6, and 8, indicating decarboxylation. During photolysis, two chloride ions were produced per molecule of picloram photolyzed. Evidence was obtained to suggest that both a free radical and an ionic mechanism are involved in the photolysis of picloram. The overall reaction proceeds by a nonchain mechanism. (Holoman-Battelle)
W74-02383

CURRENT STATUS OF THE ENVIRONMENTAL AND HUMAN SAFETY ASPECTS OF NITRILOTRIACETIC ACID (NTA),
Little (Arthur D.), Inc., Cambridge, Mass.
P. S. Thayer, and C. J. Kensler.
CRC Critical Reviews in Environmental Control, Vol 3, No 4, p 375-404, September 1973. 2 fig, 15 tab, 74 ref.

Descriptors: *Nitrilotriacetic acid, Environmental effects, Pollutant identification, *Reviews, *Public health, *Biodegradation, *Toxicity, Water pollution effects, *Soil contamination effects, Surface waters, Water pollution sources, Metabolism, Animal physiology, Water pollution, Measurement, Path of pollutants, Sewage effluents, Sewage treatment, Rivers, Streams, Organic loading, Eutrophication, Plant growth.
Identifiers: Fate of pollutants, Sensitivity, NTA chelates, Degradation products, Substrate utilization, Degradation pathways, Mobilization, Enzymatic inhibitors, Teratogenicity, Mutagenicity, Carcinogenicity, Detergent builders, Iminodiacetic acid, Receiving waters, N-methyliminodiacetic acid, Sarcosine, Glycine, Sodium nitrilotriacetate, Sewage microorganisms, Shiwassee River, Hersey River, Raisin River, St. Joseph River, Detroit River, Black River, Total organic carbon, Meramec River, Acclimatization.

A review of the available experimental and field information on nitrilotriacetic acid (NTA) indicates a very low probability of environmental or human hazard at the maximally proposed levels of use in detergents. The probable average concentrations will be low, less than 25 parts per billion (ppb), in the domestic water supply and the high concentrations, 1,500 to 20,000 parts per million (ppm), required to produce adverse effects in animals appear to provide a more than adequate margin for safety. The probable effects on the environment, including contribution towards eutrophication of estuarine bodies of water, also appear to be minimal. The use of NTA in detergents should, however, be accompanied (1) by an environmental surveillance program to ensure that the probable low concentrations of NTA are the actual concentrations, and (2) a continuing research program to further assure environmental and human safety. (Holoman-Battelle)
W74-02394

THE DISTRIBUTION OF TRACE METALS AND FAUNA IN THE FIRTH OF CLYDE IN RELATION TO THE DISPOSAL OF SEWAGE SLUDGE,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Group.
W. Halcrow, D. W. MacKay, and I. Thornton.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 3, p 721-739, August 1973. 7 fig, 10 tab, 22 ref.

Descriptors: *Water analysis, *Heavy metals, *Sediments, *Sludge disposal, *Benthic fauna, *Marine fish, Calcium, Cadmium, Chromium, Copper, Iron, Manganese, Nickel, Lead, Zinc, Mercury, Carbon, Soil analysis, Water pollution effects, Absorption, Separation techniques, Sampling, Sewage disposal, Sewage sludge.
Identifiers: Atomic absorption spectrophotometry, Sample preparation, Silver, *Firth of Clyde, Sample preservation, Acid digestion, Preconcentration, Organic carbon, Background levels, Biological samples, Macroinvertebrates, Polychaetes, Liver, Muscle.

Sediment, water, and fauna were collected from the Firth of Clyde during September, 1971 to January, 1972 for analysis of heavy metals resulting from disposal of sewage sludge. Procedures for sample preparation are given. Ca, Cd, Cr, Cu, Fe, Mn, Ni, Pb, and Zn in sediments were determined by atomic absorption. Ag was determined by optical emission spectroscopy, and As, Mo, Sn, and V by colorimetry. Fauna were homogenized, and water was solvent extracted and preconcentrated for AA analysis. Only liver and muscle were analyzed from fish. Mercury in sediments was determined by cold-vapor AA after drying and acid digestion. Results show maximum ranges of Cu, Pb, and Zn to be confined to a relatively small area withing 2 km of the center of the dumping area. Hg showed a similar pattern with peak concentrations of 1820 ng/g at the center of the dumping site. Pb and Zn contents were also high at sites further up the Clyde; however, no evidence of large-scale transport was found. Organic carbon contents were 3-8 percent compared with background levels of 0.3-2.2 percent. Epifaunal species showed rather erratic variation in trace metal content, unrelated to total or readily extractable trace metals in the underlying sediment. The trace-metal content of demersal fish species was not significantly different from figures reported for elsewhere in the United Kingdom. The distributions of some in-faunal and epifaunal species in the area are described. It is concluded that the effects of sewage sludge disposal in this area are local, gross changes being limited to an area of about 20 sq km of sea-bed. However, little is known of the overall effects of toxic wastes particularly at threshold levels, and further monitoring is required. (Little-Battelle)
W74-02420

OCCURRENCE OF HEXACHLOROPHENE AND PENTACHLOROPHENOL IN SEWAGE AND WATER,
Oregon State Univ., Corvallis. Dept. of Agricultural Chemistry.
For primary bibliographic entry see Field 05A.
W74-02426

STABILITY AND REMOVAL OF COMMERCIAL DYES FROM PROCESS WASTEWATER,
Clemson Univ., S.C.
J. J. Porter.
Pollution Engineering, Vol 5, No 10, p 27-30, October 1973. 19 fig.

Descriptors: Stability, Environmental effects, *Aquatic environment, Waste water (Pollution), Natural streams, Reservoirs, Industrial wastes, Physical properties, Light, Waste water treatment, *Dyes, Color, Organic compounds, Degradation (Decomposition), Water pollution, Water temperature, Resistance, Gamma rays, Oxidation, Activated carbon, Hydrolysis, Reverse osmosis, Chemical precipitation.
Identifiers: Basic dyes, *Acid dyes, *Direct dyes, *Photodecomposition, *Textile industry, Pollutant removal, *Decolorization, Organic dyes, Degradation rates, Fate of pollutants, Degradation products, Chemical composition, Basic Violet 3, Basic Blue 9, Basic Green 1, Basic Green 4, Basic Red 2, Acid Red 1, Acid Violet 3, Acid Red 37, Acid Orange 10, Acid Black 52, Acid Blue 40, Direct Red 80, Direct Green 6, Direct Black 80, Direct Blue 76, Direct Red 83, Artifical light, Acid anthraquinone dyes, Acid azo dyes, Thiazine dyes.

A study has been made of the more common basic, acid, and direct dyes used by the textile industry in relation to their stability to light and water under conditions similar to those encountered when they are discharged to natural streams and reservoirs. All the basic dyes (triphenylmethane, phenazine and thiazine types) studied showed appreciable degradation during their 200-hr exposure to visible and ultraviolet light. Of the acid dyes studied, three showed drastic photoinduced degradation. The acid azo dyes were more fugitive to light than the acid anthraquinone dyes. The basic reason for degradation of acid dyes seems to be their suscep-

tibility to electrophilic attack. The data show that the direct dyes are more resistant to photodegradation than are the acid and basic dyes and that they would be stable and resist photochemical degradation in a treatment plant or receiving water. The data also show that the rate of degradation for direct dyes is at least 10 times as slow in natural daylight as in artifical light. Removal of dyes from waste water will depend on dye class and chemical composition. Color removal can be accomplished by activate carbon, a combined treatment of a chemical oxidant and gamma radiation, and lime precipitation. (Holoman-Battelle)
W74-02429

THE SPREADING OF HEAVY METALS IN FLOWING WATERS IN THE REGION OF OCCURRENCE OF NATURAL DEPOSITS AND OF THE ZINC AND LEAD INDUSTRY. (ROZPRZESTRZENIENIE METALI CIEZKICH W WODACH PLYNACYCH W REJONIE WYSTEPOWANIA NATURALNYCH ZLOZ ORAZ PRZEMYSLU CYNKU I OLOWIU),
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
K. Pasternak.
Acta Hydrobiologica. Cracow, Vol 15, No 2, p 145-166, 1973. 2 fig, 3 tab, 43 ref.

Descriptors: Distribution, *Heavy metals, *Mine wastes, *Water pollution sources, Copper, Zinc, Lead, Cadmium, Manganese, Chromium, Cobalt, Molybdenum, *Water analysis, Mining, Waste disposal, Industrial wastes, Hydrogen ion concentration, Hardness (Water), Water temperature, Dissolved oxygen, Alkalinity, Iron, Sulfates, Organic matter, *Mine water, Water pollution effects, Water quality, Path of pollutants, Magnesium.
Identifiers: Strontium, Barium, Poland, Background levels, River Biala Przemsza, Preconcentration, Atomic absorption spectrophotometry, Sample preparation.

Waters from channels, streams, and rivers in the area of lead and zinc mining (Boleslaw) were analyzed for Cu, Zn, Pb, Cd, Mn, Cr, Co, Mo, Sr, and Ba to investigate the contribution of these industries to metal concentrations in the water. Samples were collected in polyethylene bags and prepared for determination of microelements (except Sr) by evaporating and dissolving the residue in nitric acid. Determinations were made by atomic absorption spectroscopy. It was found that these industries contribute significant amounts of Zn, Pb, and Cd to the receiving waters, and these metals may be transported considerable distances. Lead content decreases the fastest and zinc content the slowest as the distance from the pollution source increases. The natural occurrence of lead and zinc ores in the deeper rock layers does not to any extent influence the surface waters with pH about 8.1 and with high total hardness. The increase in the content of zinc, lead, and cadmium in the water of the investigated water courses is mainly connected with the industrial pollution. The quantitative level of these three heavy metals shows a distinct tendency to increase in the autumn-winter season. The occurrence of calcium-dolomite rocks in the catchment basin of the investigated water courses is revealed in the chemism of the water by an exceptionally high content of magnesium and a low content of manganese and copper. (Little-Battelle)
W74-02435

A COMPARISON OF THE CONTENT OF MICROELEMENTS IN THE WATER OF THE RIVER DANUBE NEAR VIENNA AND BELGRADE FOR 1961-1970 (EIN VERGLEICH DES GEHALTES AN SPURENELEMENTEN IM DONAUWASSER BEI WIEN UND BEOGRAD FUE 1961-1970),
Bundesanstalt fuer Wasserbiologie und Abwasserforschung, Vienna (Austria).
For primary bibliographic entry see Field 05A.
W74-02436

A MASS BALANCE MODEL OF TRACE METALS IN SEVERAL DELAWARE WATERSHEDS,
Delaware Univ., Newark. Coll. of Marine Studies.
R. B. Biggs, J. C. Miller, M. J. Otley, and C. I. Shields.
Available from the National Information Service as PB-226 243 $3.00 in paper copy, $1.45 in microfiche. Technical Research Project Completion Report, November 1973, 47 p, 2 fig, 7 tab, 12 ref. OWRR A-018-DEL (2).

Descriptors: *Trace Elements, *Water chemistry, *Cadmium, *Lead, *Copper, *Mercury, *Rainfall, Chemisal precipitation, Fallout, Water pollution control, Water pollution sources, Water pollution, Atlantic coastal plain, *Delaware, Pollutant identification, Water quality standards.

Concentrations of copper, cadmium, lead, and mercury were measured in seven Delaware streams and in rainfall at four locations. Annual inputs of metal to watersheds from rainfall and outputs of metal dissolved in streams were calculated. High (exceeding U.S.P.H.S. drinking water standards) concentrations of cadmium and lead were evident in rainfall especially during the winter. Metal concentrations in streams never reached such high concentrations. In southern Delaware 90% of the cadmium and 70% of the copper that enters the watershed dissolved in rain is retained by the watershed or passes out associated with suspended particulate matter. In northern Delaware, 80% of the cadmium and all of the copper (on a mass balance) that enters watersheds dissolved in rain exits the watershed dissolved in the streams.
W74-02443

THE INFLUENCE OF ORGANIC DECOMPOSITION ON CARBON DIOXIDE HYDROGEN SULFIDE, DISSOLVED OXYGEN, AND ALGAE GROWTH IN THE DWORSHAK RESERVOIR,
Idaho Univ., Moscow. Dept. of Bacteriology and Biochemistry.
For primary bibliographic entry see Field 05C.
W74-02444

HEAVY METALS IN THE MAIN STREAMS OF THE JAMES RIVER BASIN, MISSOURI,
Missouri Water Resources Research Center, Rolla.
For primary bibliographic entry see Field 05A.
W74-02445

DESCRIPTION, DISTRIBUTION, AND ECOLOGY OF THE ROTIFER AND CRUSTACEAN PLANKTON COMMUNITIES, FLATHEAD LAKE, MONTANA,
Montana Univ., Missoula. Dept. of Zoology.
For primary bibliographic entry see Field 02H.
W74-02448

DISPERSION OF SUBSTANCES FROM WELL RECHARGE OPERATIONS IN AN ANISOTROPIC, HOMOGENEOUS CONFINED AQUIFER,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 02F.
W74-02454

UPTAKE OF MERCURY BY FISH IN NATURAL AND ARTIFICIAL SYSTEMS,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Biochemistry.
D. H. Baker, III, C. J. Popp, and D. K. Brandvold.
In: State Water Plan, Proceedings of 18th Annual New Mexico Water Conference, April 5-6, 1973, Las Cruces: New Mexico State University Water Resources Research Institute Report No 026, p 40-49, July 1973. 4 fig, 7 tab, 7 ref.

Descriptors: *Water pollution sources, *Mercury, *New Mexico, Surface waters, Industrial wastes, Data collections, Water analysis, Fish, Correlation analysis, Laboratory tests, Analytical techniques.

Since New Mexico has a limited water supply, a mercury contamination problem could possibly exist on a local or state level. A small amount of mercury contamination could remove a large percentage of water from use. New Mexico at this time has a relatively mercury-free environment. The few manmade sources of mercury such as smelters and coal-burning powerplants may be too scattered and twoo small to cause any major mercury problems. Other industrial sources do not exist, and agricultural practices have not caused any documented contaminations in New Mexico's waters. Studies of mercury in natural waters throughout the State are in progress at the State Bureau of Mines. The preliminary results show that the levels of mercury are relatively low. Concentration of mercury by fish from natural waters was studied at the Bosque del Apache National Wildlife Refuge south of Socorro, New Mexico. These results are compared with data obtained from laboratory experiments of uptake by goldfish from low-level mercury concentration. (See also W74-02456) (Woodard-USGS)
W74-02460

EVALUATION OF NITRATE CONTENT OF GROUND WATER IN HALL COUNTY, NEBRASKA,
Illinois State Environmental Protection Agency, Springfield. Div. of Land Pollution Control.
R. Piskin.
Ground Water, Vol 11, No 6, p 4-13, November-December 1973. 4 fig, 8 tab, 9 ref.

Descriptors: *Nitrates, *Water pollution sources, *Groundwater, *Nebraska, Farm wastes, Fertilizers, Septic tanks, Sewage, Water table, Groundwater movement.
Identifiers: Hall County (Nebr).

Nitrate concentrations in groundwater are low (less than 10 mg per liter) in most parts of Hall County, Nebraska. Water from 46% of the sampled wells had nitrate concentrations greater than 10 mg per liter, and 13% had greater than 45 mg per liter. Sharp contrasts in concentrations occur within short distances. Seasonal changes and a progressive increase of nitrate concentrations occur in some observed wells. Concentrations decrease with increasing well depth and well penetration below the water table. Nitrate in groundwater is stratified where the concentration is high. Highest concentrations are found at or near the water table in the vicinity of sampled wells located close to a nitrate source. Potential sources of nitrate in the groundwater of Hall County are fertilizers, feedlots, septic tank effluents, seepage from the Wood River, precipitation, and soil fertility. Whereas seepage from the Wood River contributes nitrate to groundwater adjacent to the stream, seepage from the Platte River dilutes the nitrate content of groundwater. The hydraulic condutivity of the unsaturated zone is an important factor in controlling nitrate content of groundwater. (Knapp-USGS)
W74-02465

FATE OF PETROLEUM HYDROCARBONS IN BEACH SAND,
Naval Biomedical Research Lab., Oakland, Calif.
H. E. Guard, and A. B. Cobet.
Available from NTIS, Springfield, Va. 22151 as AD-758 740, Price $3.00 printed copy; $1.45 microfiche. Final Contract report, 1972. 89 p, 39 fig, 29 tab, 20 ref. USCG Contract CG-13, 337. ONR N00014-69-A-0200-1001.

Descriptors: *Oil pollution, *Beaches, *Sands, *California, *Organic compounds, Oil spills, Biodegradation, Chemical reactions, Data collections, Soil microbiology, Bacteria, Pollutant identification, Environmental effects, Ecology, Evaporation, Lysimeters.
Identifiers: *San Francisco area (Calif).

Studies at four sampling locations on three beaches in the San Francisco area affected by oil from an 840,000 gal spill of Chevron bunker fuel have shown that the size of the bacterial population and distribution of bacterial genera within the beach were unaffected by the petroleum hydrocarbons remaining in the beach sand after completion of the cleanup operation. Only 15% of the beach bacteria were affected by a variety of petroleum components including the pentane soluble fraction of the bunker fuel. Abnormally high concentrations of chloroform extractable material with considerable variation were observed at two sampling locations following the spill. Log-normal distribution analysis of the concentration of the chloroform extractable material indicates that the sampling locations on the San Francisco Bay have higher background levels (5% limit concentrations) of chloroform extractable material than the beaches on the ocean. Laboratory experiments indicated that the lower molecular weight components of bunker fuel dispersed in a beach will be removed by evaporation, dissolution and biodegradation acting in concert. (Woodard-USGS)
W74-02473

SELECTED REFERENCES, GROUND-WATER CONTAMINATION, THE UNITED STATES OF AMERICA AND PUERTO RICO.
Geological Survey, Washington, D.C. Water Resources Div.

Open-file report, 1973. 103 p.

Descriptors: *Bibliographies, *Water pollution sources, *Groundwater, *United States, *Puerto Rico, Information retrieval, Publications, Water quality, Groundwater resources, Pollutant identification, Path of pollutants, Water pollution effects, Water pollution control, Environmental effects, Surface-groundwater relationships.

In 1972 the U.S. Geological Survey, Water Resources Division, made a reconnaissance study of the location and severity of groundwater contamination throughout the 50 States and Puerto Rico. During the course of that study a substantial list of references pertaining to groundwater contamination was obtained. The references are listed alphabetically and are also indexed according to geographic areas, States, kinds of contamination, sources of contamination, and general discussions. (Woodard-USGS)
W74-02482

ON THE CHARACTERISTICS OF SALT INTRUSION IN THE KITAKAMI RIVER, MIYAGI PREFECTURE (IN JAPANESE),
Japanese Society of Limnology, Otsu (Japan).
Y. Tontani.
Jap J Limnol, Vol 33, No 1, p 1-5, 1972. Illus. English summary.
Identifiers: *Japan (Kitakami River), Rivers, *Salt water intrusion, *Salinity, Water temperature, Velocity.

During the period 1965-1968, determinations were made of salinity, temperature and velocity in the Kitakami River (Japan). The salinity concentration of the bottom layer is much higher than the surface layer at the lower end of the river. Consequently, the water of the surface layer is fresh water and that of the bottom layer is salt water. The salt wedge type of the Kitakami River shows fine negligible mixing. This phenomenon is rare, because in the rivers emptying into the Pacific Ocean, it is generally moderate mixing. The salt wedge type is caused by the level difference between the low water and the higher water, but it is also caused by discharge. The salt wedge length was affected by an influence of discharge. When discharge decreases to about 70 m3/sec, the salt water intrudes into upper stream, about 8 km from river mouth. But, when discharge increases to about 400 m3/sec, the salt water is restricted to the vicinity of the river mouth.--Copyright 1973, Biological Abstracts, Inc.
W74-02541

CLEANLINESS OF WELLS, CHEMICAL SUBSTANCES IN DRINKING WATER AND THEIR RELATION TO CARIES (IN POLISH),
For primary bibliographic entry see Field 05C.
W74-02544

HYGIENIC CONDITIONS IN THE PROCUREMENT OF DRINKING WATER FROM INDIVIDUAL SOURCES (IN GERMAN),
J. Preuner Von Prittwitz.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med, Vol 155, No 5, p 374-383, 1972, English summary.
Identifiers: *Bacteria, *Hygienic conditions, *Potable water, Water wells, Water sources.

Wells, when used as a source of drinking water, constitute a direct danger from the hygienic and bacteriological aspects for the persons who are supplied with this drinking water. An urgent demand is made for the revision of the regulations concerning the sinking of wells, in order that the digging of wells shall be prohibited in general, even if it is carried out by firms specializing in this work. In addition, the public authorities (Health Department, Police, Hygiene Institute, Parish and Rural District Councils) should endeavor to replace existing wells with supplies of pure drinking water, if such water can be obtained or delivered, even if this is accompanied by higher costs.--Copyright 1973, Biological Abstracts, Inc.
W74-02547

INFLUENCE OF HERBICIDES ON MICROBIOLOGICAL CONDITIONS,
Komenskeho Universita, Bratislava (Czechoslovakia). Dept. of Microbiology.
A. Dubovska.
Acta Fac Rerum Nat Univ Comenianae Microbiol. 1. p 53-65, 1971, Illus.
Identifiers: *Atrazine, *Azotobacter, Fungi, *Herbicides, Microbiological conditions, Organic matter, *Simazine, Soil moisture, Microorganisms.

Seasonal changes of the groups of microorganisms depended predominantly on soil moisture and the amount of organic material in the soil. Simazine and atrazine, added to the soil at the rate of 80-1000 ppm, stimulated N fixation by Azotobacter in laboratory experiments, but not in field trials. Simazine and atrazine exerted the strongest inhibition on the quantity and dynamics of fungi. The influence of these herbicides, both on ammonia-forming microorganisms and on pectinolytic and aerobic cellulolytic microorganisms differed according to ecological factors. Azotobacter was slightly susceptible to the herbicides in the doses used.--Copyright 1973, Biological Abstracts, Inc.
W74-02548

THE EFFECT OF TEMPERATURE ON THE GENERATION TIME OF A BACTERIAL COMMUNITY IN LAKE WATER,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
W. A. Godlewska-Lipowa.
Bull Acad Pol. Sci Ser Sci Biol. Vol 20, No 9, p 653-656. 1972. Illus.
Identifiers: *Bacterial community, *Generation, Lakes, *Water temperature.

The effect of temperature on the reproduction intensity of a bacteria population in natural lake water was examined as was the generation time. The most intensive increase in number took place at 25, and the least intensive at 6 and 30C. The generation time of the bacteria community according to Razumov was shortest at 25 and longest at 6 and 30.--Copyright 1973, Biological Abstracts, Inc.
W74-02557

THE USE OF ERTS-1 MSS DATA FOR MAPPING STRIP MINES AND ACID MINE DRAINAGE IN PENNSYLVANIA,
Pennsylvania State Univ., University Park. Office for Remote Sensing of Earth Resources.
For primary bibliographic entry see Field 07B.
W74-02573

MONITORING OCEAN DUMPING WITH ERTS--1 DATA,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 07B.
W74-02580

A REPORT ON BACTERIAL POLLUTION AFFECTING SHELLFISH HARVESTING IN NEWPORT RIVER, NORTH CAROLINA.
Environmental Protection Agency, Athens, Ga. Surveillance and Analysis Div.

Available from NTIS, Springfield, Va. 22151 as PB-215 291. Price $3.00 printed copy; $1.45 microfiche. Region IV Report, April 1972. 43 p, 9 fig, 10 tab, 11 ref, 2 append.

Descriptors: *Water pollution sources, *Bacteria, *Estuaries, *North Carolina, Environmental effects, Shellfish, Coliforms, Sewage effluents, Septic tanks, Animal wastes (Wildlife), Fertilizers, Sampling, Tributaries, Tidal effects, Salinity, Data collections, Evaluation, Path of pollutants, Water pollution effects.
Identifiers: *Newport River (NC).

Portions of the Newport River in North Carolina have been closed to shellfish harvesting since 1969 due to excessive levels of coliform bacteria in the growing waters. Closure of the area to shellfish harvesting coincided with a by-pass of untreated domestic wastes from the town of Newport. During the December 1971 study period, excessive coliform levels in the shellfish growing areas of the Newport River were not attributable to waste discharges from the Newport sewage treatment plant or the West Cateret High School waste treatment facility. The majority of the coliform population contributed to the upper Newport River estuary is introduced from tributary streams and sources incidental to the river shore. Of the tributaries sampled above 'The Narrows,' Deep Creek and Hull Swamp contribute the largest number of coliforms. Wildlife common to these areas, together with agricultural runoff, serve as major sources of coliform contamination within the watershed. The concentration of septic tanks in the unincorporated areas of the watershed, especially those installed in areas unsuited for adequate operation, have the potential for contributing bacterial pollution to the Newport River and tributary streams. (Woodard-USGS)
W74-02621

BASIC WATER-QUALITY DATA FOR POLLUTION ABATEMENT PLAN, TAMPA BAY AREA, FLORIDA,
Geological Survey, Tallahassee, Fla.
R. C. Reichenbaugh, J. S. Rosenshein, and R. L. Westly.
Open-file report 73020, 1973. 137 p, 1 fig, 8 tab.

Descriptors: *Water quality, *Water pollution sources, *Chemical analysis, *Data collections, *Florida, Storm runoff, Surface waters, Water

pollution control, Pollution abatement, Municipal wastes, Industrial wastes, Sewage effluents, Water analysis, Nutrients, Trace elements.
Identifiers: *Tampa Bay area (Fla).

The Tampa Bay Regional Planning Council is formulating a waste-water treatment plan for the greater Tampa Bay area in cooperation with the Environmental Protection Agency. The area covered by this plan includes Hillsborough, Manatee, Pasco, Pinellas, and Sarasota Counties, Florida. In October 1972, the Planning Council entered into a cooperative agreement with the U.S. Geological Survey to collect and analyze water samples from streams, industrial plants, sewage treatment plants, and their receiving waters. The analyses are to be used in the Planning Council's modeling effort and as benchmark information on water-quality conditions in the greater Tampa Bay area. This report makes available the water-quality data collected as a part of this study and also the data obtained in the cooperative programs between the Geological Survey and other agencies, such as the Southwest Florida Water Management District. Data on water quality at nine stream sites with records as much as 19 years are also included. (Woodard-USGS)
W74-02629

SEASONAL AND AREAL DISTRIBUTION AND ABUNDANCE OF THE COPEPODA IN A MISSISSIPPI ESTUARINE SYSTEM,
Mississippi Marine Conservation Commission, Biloxi.
For primary bibliographic entry see Field 02L.
W74-02637

STUDIES OF THE SINKING PLUME PHENOMENON,
Argonne National Lab., Ill. Center for Environmental Studies.
For primary bibliographic entry see Field 05C.
W74-02644

SEDIMENTATION AND SCOUR OFF NUCLEAR POWER PLANTS,
Wisconsin Univ., Madison. Marine Research Lab.
For primary bibliographic entry see Field 02J.
W74-02645

5C. Effects of Pollution

THE EFFECTS OF ACID MINE WATER ON GROWTH (NUMBER AND SIZE) OF CHLORELIA VULGARIS,
West Virginia Univ., Morgantown. Dept. of Biology.
W. A. Janeczek, E. C. Keller, III, W. J. Shoupp, and E. C. Keller, Jr.
Proceedings of the West Virginia Academy of Science, Vol 44, No 1, p 40-49, April, 1972. 6 fig, 1 tab, 8 ref.

Descriptors: *Algae, *Acid mine water, *Chlorella, Water pollution, Water pollution effects, Water quality, *Chlorphyta, *Growth rates, Size, Growth stages, Cultures, Ecosystems.

Growth in Chlorella vulgaris was examined under axenic conditions in a variety of acid mine water (AMW) concentrations, and inorganic nutrient media, to ascertain the relationship between cell number and cell size. High concentration of AMW (above 3/16) decreased the average cell size. At concentrations of 3/16 AMW or more, cell number was greatly decreased. The normal relationship that exists between cell size and cell number during growth was greatly modified by AMW concentrations greater than 3/16. (See also W74-02169)
W74-02168

THE GROWTH OF CHLORELLA VULGARIS IN SEWAGE AND ACID MINE WATER,
West Virginia Univ., Morgantown. Dept. of Biology.
W. F. Skinner, and E. C. Keller, Jr.
Proceedings of the West Virginia Academy of Science, Vol 44, No 1, p 49-56, April, 1972. 4 fig, 6 ref.

Descriptors: *Algae, *Acid mine water, *Chlorella, Water pollution, Water pollution effects, Water quality, *Chlorphyta, *Growth rates, Growth stages, Cultures, Ecosystems, *Sewage.

Preliminary research has been conducted to determine the effects of sewage, acid mine water (AMW), and their interaction on the growth of the unicellular green alga Chlorella vulgaris Beijerink (Pratt strain). The nutrient media were composed of sterile synthetic sewage and/or acid mine water diluted to the desired concentrations with a standard inorganic culture medium (modified Beijerinck's medium). Six concentrations of sewage (0/0, 1/32, 1/16, 1/8, 1/4, 1/2), four concentrations of AMW (0/0, 1/31, 1/16, 1/8), alone and in all possible combinations were evaluated. The cultures were grown at 25C in 24x150 mm glass culture tubes, aerated, and agitated with sterile humidified air, and illuminated from below by approximately 500 f.c. light intensity by 'Gro-lux' fluorescent tubes. The maximum growth was obtained with the 1/2 sewage treatment, the least amount of growth occurred in the 1/8 AMW + 1/2 sewage treatment. Chlorella vulgaris was apparently able to utilize some of the components in the sewage since better growth occurred in all treatments containing only sewage than in the controls. However, high concentrations of sewage in combination with high concentrations of AMW inhibited algal growth. (See also W74-02168)
W74-02169

AN INVESTIGATION OF THE PHYSICAL EFFECTS OF THERMAL DISCHARGES INTO CAYUGA LAKE,
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 05B.
W74-02178

PERSISTENT SEA-FOAM MASSES -- A PROBLEM SOLVED,
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 05B.
W74-02180

ON THE RELATION BETWEEN THE OCCURRENCE OF DESMIDS AND THE SALINITY IN THE HOKURIKU DISTRICT OF JAPAN, (IN JAPANESE).
Nijo Junior High School, Kyoto (Japan).
For primary bibliographic entry see Field 05B.
W74-02191

SOME REGULARITIES OF SR90 ACCUMULATION IN THE BODY OF A RAT WITH A HIGH FLUORINE CONTENT IN ITS DRINKING WATER, (IN RUSSIAN),
E. V. Danetskaya, V. A. Knizhnikov, P. V. Ramzaev, and M. N. Troitskaya.
Gig Sanit. Vol 37, No 8, p 49-53. 1973. (English summary).
Identifiers: *Fluorine content, Rats, *Strontium-90, *Potable water.

Preliminary introduction (for 1.5 mo.) of F in water produced a decrease in the Sr90 concentration in the ashes of rat bones and corpses. The total content of the isotope in the body was unaltered.--Copyright 1973, Biological Abstracts, Inc.
W74-02195

SOME CHARACTERISTICS OF CESIUM-137 ACCUMULATION IN POPULATIONS OF FRESHWATER FISH, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Morphology and Animal Ecology.
A. I. Il'enko.
Vopr Ikhtiol. Vol 12, No 1, p 174-178. 1972. Illus.
Identifiers: *Cesium-137, Fish (Fresh water), Muscle, *Pike, Fish populations, *Roach, Water pollution effects.

The experiments were performed in a water reservoir with an artificially changing Cs-137 source. The seasonal changes in concentration of the isotope in the muscle of roach and pike, in food, and water were determined. The concentration of the isotope in the food and of roach muscle in the roach reflected its concentration in the water. However the same was not true for the pike: the concentration in the muscles did not correspond to the concentration in the water.--Copyright 1973, Biological Abstracts, Inc.
W74-02196

ACCUMULATION OF STRONTIUM AND CALCIUM IN FRESHWATER FISHES OF JAPAN,
National Inst. of Radiological Sciences, Chiba (Japan). Dept. of Environmental Contamination.
Y. Suzuki, R. Nakamura, and T. Ueda.
J Radiat Res. Vol 13, No 4, p 199-207. 1972. Illus.
Identifiers: Bone, *Calcium, *Carp, Fallout, Fish (Freshwater), *Gibel, Japan, *Strontium-90, Water pollution effects.

The 90Sr contents in bones of freshwater fishes (carp and gibel) from radioactive fallouts were investigated in relation to those in the surrounding waters from 1963-1970. The specific activities (90Sr/Sr) of fish bones and of the surrounding waters declined rapidly from 1963-1964, followed by a gradual decline from 1964-1970. The specific activities of fish bones were always slightly higher than those of the waters, except that of gibel in 1963. The time lag between Sr specific activities of fish bones and those of surrounding waters were 270 days for carp and 360 days for gibel. The discrimination between stable Sr and Ca in freshwater fishes was demonstrated: in the field studies, the Sr-Ca observed ratio (OR) were determined as 0.74 plus or minus -.05 for carp and 0.84 plus or minus 0.07 for gibel respectively. In rearing experiments, the Sr accumulation of carp reared in the water of 2 x 10-1 mg Ca/l. It is possible to estimate 90Sr content in the bones of carp and gibel by using their OR values and the time lag of Sr specific activity between the freshwater fish bone and the surrounding water.--Copyright 1973, Biological Abstracts, Inc.
W74-02197

SALT, A LITTLE-KNOWN AGGRESSOR IN OUR ENVIRONMENT, (IN FRENCH),
Neuchatel Univ. (Switzerland). Centre de Hydrogeologie.
For primary bibliographic entry see Field 05B.
W74-02199

AN ECOLOGICAL EVALUATION OF STREAM EUTROPHICATION,
Michigan State Univ., East Lansing. Inst. of Water Research.
R. C. Ball, and N. R. Kevern.
Available from NTIS as PB-226 140 $6.50 in paper copy, $1.45 in microfiche. OWRR-3381 (No 3723) (9), C-2205 (No 3386) (5), and C-1663 (No 3153 (7). Project Completion Report, July 1973. 253 p, 69 fig.

Descriptors: Brown trout, Sculpin, Toxicity, *Eutrophication, Water quality, Discharge (Water), *Macrophytes, *Phosphorus, Nitrogen, *Periphyton, *Invertebrates, *Benthos, Artificial substrates, Fish populations, Drift, Metabolism, Chlorinated hydrocarbons, Pesticides, Social aspects, Recreation, *Michigan.

Identifiers: Jordan River (Mich), Au Sable River (Mich), Red Cedar River (Mich), National Fish Hatchery.

Three streams, varying in degree of disturbance by man, were selected for study; ranging from pristine to heavily disturbed. The aims of the study were to develop indices for predicting changes in streams as they are subjected to increasing eutrophication, to obtain baseline data that relates stream characteristics to water quality, to evaluate the effects of urbanization on stream stability and to measure the aesthetic and recreational values of streams. Diurnal patterns in dissolved oxygen concentration were highly correlated with known nutrient loadings and trophic condition. As human disturbance increases, fluctuations of stream discharge around the annual mean also increases. Phosphorus content within macrophyte tissues reflected water concentrations, while nitrogen content was related to phosphorus content. Macrophyte standing crop was influenced more by stream morphology than by level of enrichment. As the nutrient loadings increased, deviation of standing crop also increased. The estimation of periphyton production rates via artificial substrata holds promise as a technique for the detection of nutrient rich inputs to streams. Examination of species associations indicated several taxonomic groups of diatoms which appear to be related to water quality. The species diversity of benthic macroinvertebrates was well correlated with level of disturbance. High diversity indices were related to high water quality. Studies of the trout populations in two rivers indicate that there are fewer and larger fish at the more eutrophic sites. Increasing eutrophication is most evident in the growth rate of young-of-the-year fish. (See also W74-02202 thru W74-02204)
W74-02201

SOME LIMNOLOGICAL REMARKS ON LAKE SAIZUCHI-NUMA, YAMAGATA PREFECTURE, (IN JAPANESE),
Yamagata Univ. (Japan). Lab. of Science Education.
H. Kaito.
Jap J Limnol. Vol 33, No 1, p 6-10. 1972. Illus. (English summary).
Identifiers: Chemical stratification, *Japan (Lake Saizuchi-Numa), Lakes, Limnological studies, *Lake stratification, Thermal stratification, *Anaerobic condition.

Lake Saizuchi-numa, situated on the boundary of Mogami and Kitamurayama districts in Yamagata Prefecture (Japan) is considered to be a type of the tectonic lakes from the geological point of view. At the summer stagnation period, thermal as well as chemical stratifications are observed and the anaerobic layer develops near the bottom. The annual observation reveals that the main constituent of the dissolved substances in NaCl which is transported by snow from Japan Sea in winter time. Throughout this season, the sea-breezed salt by monsoon is accumulated in fallen snow which will melt and furnish this lake. This lake is dystrophic.--Copyright 1973, Biological Abstracts, Inc.
W74-02207

COMPUTER SIMULATION OF TROPHIC LEVEL INTERRELATIONSHIPS IN CAYUGA LAKE,
Cornell Univ., Ithaca, N.Y.
R. Plant, R. Lance, and W. Youngs.
Available from the National Technical Information Service as PB-226 105, $3.00 in paper copy, $1.45 in microfiche. Cornell University Water Resources and Marine Sciences Center, Technical Report No. 69, August 1973. 26 p, 9 fig, 3 tab. OWRR A-040-NY (1). 14-31-0001-3832.

Descriptors: *Computer models, Model studies, *Food chains, *Trophic level, Lakes, Lake trout, Phytoplankton, Zooplankton, *New York, *Simulation analysis.
Identifiers: *Cayuga Lake (New York).

An attempt is described to simulate a particular trophic chain in Cayuga Lake. The chain, consisting of phytoplankton, zooplankton, alewives and lake trout, was selected primarily because it is largely independent of other inhabitants of the lake, and represents a complete food chain running from primary producer to final predator. The primary objectives were: (1) to formulate a model displaying a behavior similar to that observed in the species populations in the trophic chain; (2) to test the behavior of this model under variation of its parameters; and (3) to use the model as a guide in developing programs for future research, both theoretical and in the field. As such it was necessary to base the model on theory sufficiently detailed to provide useful information but not so complex as to be mathematically intractable. Based on the field data available, it was decided that the most suitable model was one based on the classical Lotka-Volterra equations (Lotka, 1925). These are a system of interrelated non-linear first order differential equations in which each relevant parameter is represented as a single time dependent variable; while the closed form solution of this system cannot be written explicitly, its behavior has been thoroughly studied (Davis, 1961).
W74-02216

EXPERIMENTAL STUDIES ON PHYTOPLANKTON SUCCESSION IN CAYUGA LAKE,
Cornell Univ., Ithaca, N.Y.
B. J. Peterson, A. E. Savage, and J. P. Barlow.
Available from the National Technical Information Service as PB-226 068, $3.00 in paper copy, $1.45 in microfiche. Cornell University Water Resources and Marine Sciences Center, Technical Report No. 71, 1973. 23 p, 7 fig, 3 tab, 37 ref. OWRR A-035-NY (1). 14-31-0001-3532.

Descriptors: *Phytoplankton, *Succession, Lakes, *Carbon, *Phosphorus, *Nutrients, *New York.
Identifiers: *Cayuga Lake (New York).

Natural phytoplankton assemblages from Cayuga Lake were maintained under controlled nutrient conditions in large volume continuous flow laboratory cultures. Changes in the C:P ratio, rate of carbon uptake per unit carbon, and species composition were followed in nutrient limited chemostats and nutrient sufficient turbidostats. Rates of change of relative abundance and final values for the C:P ratio and rates of carbon uptake per unit carbon are related to parameters describing the lake populations. These comparisons suggest that Cayuga Lake phytoplankton are limited by phosphorus but are rarely phosphorus deficient.
W74-02217

ATTEMPT AT MOLLUSK CONTROL BY INCREASING THE PLANKTONIC BIOMASS AND BY MOLLUSCICIDAL TREATMENT: THE UREA-N-TRITYLMORPHOLINE ASSOCIATION (IN FRENCH),
Institut Tropical Suisse, Basel.
P. Perret, M. Egger, and A. A. Degremont.
Acta Trop, Vol 29, No 2, p 175-181, 1972, English summary.
Identifiers: *Biomass (Plankton), Breeding, Bulinus-sp, *Molluscicidal treatment, *Mollusk control, Schistosoma-haematobium, *Snails, *Urea.

An antisnail molluscicide treatment is described which is based on the simultaneous application of urea and the molluscicide N-tritylmorpholine. When diluted with water the endothermic reaction of urea causes sufficient movement to thoroughly disperse the molluscicide. As a nutritive substance, urea increases the biomass of plankton in such quantity that snail breeding seems to be inhibited. The experiment was done in a reservoir pool which throughout the year contained molluscs of the genus Bulinus, the natural host of Schistosoma haematobium. Earlier attempts to keep the pool free of Bulinus sp. necessitated bimonthly treatment with molluscicides. After the combined application of urea and N-trityl-morpholine the snails were completely absent during a period of 5 mo.--Copyright 1973, Biological Abstracts, Inc.
W74-02226

RELATION OF MINERAL AND HORMONE METABOLISM TO INTAKE OF WATER WITH A HIGH NATURAL CONTENT OF FLUORIDE,
L.L.R.M. Medical Coll., Meerut (India). Dept. of Pathology.
G. K. Tiagi, S. P. S. Teotia, and M. Teotia.
Fluoride. Vol 5, No 4, p 213-219. 1972.
Identifiers: *Fluride, Hormones, *Metabolism (Human), Minerals, *Potable water, Public health, *Calcium absorption.

The metabolic effects of intake of low and high natural fluoride water were studied on 8 subjects over a period of 180 days. In the 4 subjects drinking high fluoride water (10.35 ppm) there was a definite increase in the intestinal absorption of Ca, gradual rise in plasma alkaline phosphatase, and increased retention of Ca as revealed by balance studies. Plasma, Ca, P, Mg, PBI (protein bound iodine), plasma-cortisol and urinary steroids showed no significant change. In the 4 subjects drinking low fluoride water (0.5 ppm) no changes were produced.--Copyright 1973, Biological Abstracts, Inc.
W74-02235

OCCURRENCE OF SAPROCHAETE SACCHAROPHYLA COKER ET SHANOR IN FUNGOID GROWTH BELOW THE DISCHARGE OF BREWERIES, (IN CZECH),
For primary bibliographic entry see Field 05B.
W74-02242

EFFECT OF HEATED WATER FROM KONAKOV HYDRO-ELECTRIC STATION ON OXYGEN CONTENT AND DEVELOPMENT OF PHYTOPLANKTON IN IVAN'KOVSKOE RESERVOIR DURING WINTER, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 05B.
W74-02244

EFFECT OF SUPERNATANT FLUID OF THE ANKISTRO-DESMUS BRAUNII BRUNNTH CULTURE ON DEVELOPMENT OF ALGAE IN WASTE WATERS OF THE CHERNIGOV CHEMICAL FIBER INDUSTRIAL GROUP, (IN UKRAINIAN),
Akademiya Nauk URSR, Kiev. Instytut Botaniki.
H. M. Palamar-Mordvyntseva, and V. V. Stupyna.
Ukr Bot Zh. Vol 29, No 3, p 294-299. 1972. (English summary).
Identifiers: Algae, *Ankistrodesmus-Braunii, *Chemical fiber wastes, Chlamydomonas, Chlorella, Culture, Development, Industrial wastes, Pinnularia, Scenedesmus, Stimulant, *Supernatant fluid, *USSR, Chernigov, Waste waters.

The effect of supernatant fluid of the A. braunii culture on development of algae in waste waters of the Chernigov (USSR) group of chemical fiber enterprises was studied under laboratory conditions. The alga under study apparently excretes into the environment peculiar, physiologically active substances which in small doses stimulate development of wild species of Chlorella, Scenedesmus, Pinnularia and Chlamydomonas. The stimulating and inhibiting effect of the supernatant fluid of the Ankistrodesmus culture is established to depend on the supernatant fluid dose introduced into the medium and Ankistrodesmus growth conditions (age and nutrient conditions of the culture).--Copyright 1973, Biological Abstracts, Inc.
W74-02245

LAKE SARY-CHELEK AND ITS ZOOPLANKTON, (IN RUSSIAN),
Tashkent Univ. (USSR).
For primary bibliographic entry see Field 02H.
W74-02261

MEASURING STRESS IN FISH EXPOSED TO PULP MILL EFFLUENTS,
British Colombia Research Council, Vancouver.
T. E. Howard, and C. C. Walden.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 15-18, 2 tab, 2 fig, 20 ref.

Descriptors: *Bioassay, *Pulp wastes, *Fish physiology, *Toxicity, *Water pollution effects, *Analytical techniques, Industrial wastes, Pollutants, Fish, Respiration, Thermal pollution, Temperature, Pollutant identification.
Identifiers: Sublethal pollution effects, Short-term bioassay, Kraft mills.

Field bioassays of effluent effects on aquatic organisms are costly, time-consuming, and retrospective. Therefore, short-term bioassay techniques have been developed to evaluate responses of fish to pollution loads at sublethal concentrations, as reflected by changes in respiration, swimming ability, temperature tolerance, and blood chemistry. Examples of such short-term bioassays, applied to the evaluation of kraft mill effluent toxicity, are presented. These methods are regarded as complementary to, rather than competitive with, long-term investigations or detailed ecological studies. (See also W74-02273) (Brown-IPC)
W74-02276

LABORATORY AND CONTROLLED EXPERIMENTAL STREAM STUDIES OF THE EFFECTS OF KRAFT EFFLUENTS ON GROWTH AND PRODUCTION OF SALMONID FISH,
Oregon State Univ., Corvallis.
C. E. Warren, W. K. Seim, R. O. Blosser, A. L. Caron, and E. L. Owens.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 19-26, 10 fig, 18 ref.

Descriptors: *Toxicity, *Pulp wastes, *Fish, *Water pollution effects, Salmon, Trout, Aquaria, Biochemical oxygen demand, Aquatic organisms, Algae, Insects, Effluents, Industrial wastes, Pulp and paper industry.
Identifiers: Kraft mills.

Based on results of a six-year study, neither primary- nor secondary-treated kraft mill effluents impaired the growth of salmonid fish (coho and Chinook salmons, and brown and cutthroat trouts) in aquaria at BOD concentrations below 0.5 g/liter, but did affect the fish at higher concentrations. In laboratory stream communities and experimental stream channels, these effluents had no deleterious effects on salmonid growth and biomass production at BOD concentrations of 0.5 mg/liter, but did change the composition of the benthic community of algae and insects. At the same BOD concentrations, effluents from another kraft mill exerted less effect on aquarial salmonids than those from the first mill studied. (See also W74-02273) (Brown-IPC)
W74-02277

EFFECT OF IRRIGATION, FERTILIZATION, AND OTHER CULTURAL PRACTICES ON WATER QUALITY,
Idaho Univ., Moscow. Water Resources Research Inst.
D. V. Naylor, and J. R. Busch.
Available from the National Technical Information Service as PB-226 113, $3.00 in paper copy, $1.45 in microfiche. Completion Report, September 1973. 19 p, 1 fig, 3 ref. OWRR A-036-IDA (1). 14-01-001-3512.

Descriptors: *Furrow irrigation, Surface runoff, Groundwater, *Nutrients, Solids, Computer models, Water balance, Sugar beets, Beans, Onions, Nitrogen, *Fertilizers, Sediments, *Idaho, Water quality, Computer programs, Phosphorus, Sedimentation basins (Waste disposal).
Identifiers: *Boise Valley (Idaho), Sediment ponds.

A farming unit in an intensively cropped, furrow irrigated agricultural area of the Boise Valley in southwestern Idaho was instrumented for two cropping seasons to measure the quantities of water entering and leaving the area. Surface and groundwater samples taken from the unit were analyzed for nutrient and solids content. A computer program was developed and used to compute a nutrient, total solids and water budget for the unit based on water measurements, climatic measurements, cropping data and chemical analyses. Excessive amounts of water applied to onion crops were responsible for a portion of the applied water entering the groundwater through deep percolation carrying with it part of the nitrogen applied as fertilizer. However, the other crops, sugar beets and beans, were found to use shallow groundwater for part of their consumptive use requirements. The only materials which were lost from the farm in appreciable quantities in the surface runoff were total solids and the associated phosphorous except when nitrogen was added to the irrigation water as fertilizer. Sediment ponds installed on the farm were found to be effective in removing sediments and phosphorous from the surface runoff.
W74-02321

A TECHNIQUE FOR EVALUATING ALGAL GROWTH POTENTIAL IN ILLINOIS SURFACE WATERS,
Illinois State Water Survey, Urbana.
W. C. Wang, W. T. Sullivan, and R. L. Evans.
Report of Investigation 72, 1973. 16 p, 21 fig, 10 tab, 37 ref.

Descriptors: *Algae, *Eutrophication, *Analytical techniques, *Illinois, Analysis, Fluorescence, Spectophotomery, Alkalinity, Hardness (Water), Laboratory tests. Testing procedures, Pollutant identification, Biomass.
Identifiers: *Algal growth potential.

Various techniques were used to measure the algal growth potential (AGP) of Illinois surface waters. The AGP is defined as the algal or organic mass resulting from a 7-day incubation of a culture grown on a natural water substrate under standardized laboratory conditions and expressed as milligrams of dry organic matter per liter of sample. This definition resulted from the measurement of algal growth in 155 samples from 3 lakes, 4 streams and 2 sewage sources. The process involves measuring changes of light absorption, fluorescence of algal pigments, filterable organic and inorganic mass, total alkalinity, and hardness. Analysis showed filterable organic mass to be the most reliable criterion for quantifying algal growth. The AGP of water and sewage samples were found to vary from between 12 mg/l for water from Lake Eureka to 120 mg/l for raw sewage and 135 mg/l for water from a tertiary effluent sewage pond. The development of the AGP parameter will provide a new diagnostic tool for planning and managing water resources, as it indicates the potential for eutrophication, although the relationship of the AGP and observed nutrient levels is uncertain at present. (Poertner)
W74-02342

DISSIPATION AND PHYTOTOXICITY OF DICAMBA RESIDUES IN WATER,
Texas A and M Univ., College Station. Dept. of Range Science.
For primary bibliographic entry see Field 05B.
W74-02370

ACCUMULATION OF FOSSIL CO2 IN THE ATMOSPHERE AND THE SEA,
Institute of Nuclear Sciences, Lower Hutt (New Zealand).
A. W. Fairhall.
Nature, Vol 245, No 5419, p 20-23, September 7, 1973. 4 fig, 15 ref.

Descriptors: *Mathematical models, *Carbon dioxide, *Water pollution effects, *Mollusks, *Calcium carbonate, *Sea water, *Fossil fuels, Equations, Oceans, Reefs, Path of pollutants, Air pollution effects, Forecasting, Corals.

A model showing the relationship between the accumulation of CO2 in the atmosphere from fossil fuels and the levels in the sea predicts that the rapid increase in atmospheric CO2 will cause the sea to become undersaturated in CaCO3. The possible result of this undersaturation is that coral reefs and shells of organisms would tend to dissolve. The model is based on the premise that the long lived terrestrial biosphere and humus are not significant sinks for fossil CO2 emissions. The predictions of the model remain to be validated and the effect of undersaturation of CaCO3 on calcareous organisms is not presently known. (Little-Battelle)
W74-02375

CURRENT STATUS OF THE ENVIRONMENTAL AND HUMAN SAFETY ASPECTS OF NITRILOTRIACETIC ACID (NTA),
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05B.
W74-02394

FREQUENCY OF FISH TUMORS FOUND IN A POLLUTED WATERSHED AS COMPARED TO NONPOLLUTED CANADIAN WATERS,
Chicago Medical School, Ill. Dept. of Microbiology.
E. R. Brown, J. J. Hazdra, L. Keith, I. Greenspan, and J. B. G. Kwapinski.
Cancer Res, Vol 33, No 2, p 189-198, 1973, Illus.
Identifiers: Arsenic, Bacteria, Benzanthracene, *Illinois (Fox River), Carbons, Carcinogens, Chlorinated hydrocarbons, Coliform, Crude oil, *Fish tumors, Gasoline, Hydro, Lead, Mercury, Nonpolluted waters, Phosphates, Polluted waters, Rivers, Sulfates, Toluene, Tumors, Watersheds.

Data are presented on the incidence of tumors found in 2121 fish examined from the Fox River watershed (4.38%) as compared to 4939 fish examined in Canada (1.03%). The water systems were compared as to pollution potentials, and the Fox River was found to be a highly polluted system. Among the pollutants found were Hg, Pb, As, toluene, crude oil, gasoline, benzanthracene, chlorinated hydrocarbons, phosphates, sulfates and coliform bacteria. Factors such as dissolved O2 content, temperature and nutritional variation were considered similar in both water systems. It is concluded that these pollutants were responsible for the greater frequency of tumors. No attempts were made to determine the effects of pollution of the long term human users of the water or to determine the virus contents of the water system under study.--Copyright 1973, Biological Abstracts, Inc.
W74-02401

ISOLATION AND CLEANUP OF ORGANOPHOSPHORUS INSECTICIDES AND THEIR OXONES FROM ANIMAL TISSUES,
Institute of Industrial Hygiene and Occupational Diseases, Bratislava (Czechoslovakia).
For primary bibliographic entry see Field 05A.
W74-02403

IRON, ZINC, MAGNESIUM, AND COPPER CONCENTRATIONS IN BODY MEAT OF THE BLUE CRAB, CALLINECTES SAPIDUS,
Maryland Univ., Solomons. Natural Resources Inst.

For primary bibliographic entry see Field 05A.
W74-02409

CHLORINATION EFFECTS ON ORGANIC CONSTITUENTS IN EFFLUENTS FROM DOMESTIC SANITARY SEWAGE TREATMENT PLANTS,
Oak Ridge National Lab., Tenn.
R. L. Jolley.
Report No ORNL-TM-4290, October 1973. 342 p, 29 fig, 52 tab, 396 ref, 7 append. W-7405-eng-26.

Descriptors: *Chlorination, *Organic compounds, *Radioactivity techniques, *Sewage treatment, Sewage effluents, *Domestic wastes, Chlorine, Methodology, Environmental effects, Sampling, Chemical reactions, Anion exchange, Aqueous solutions, Separation techniques, Laboratory tests, Laboratory equipment, Cation exchange, Tracers, Organic acids, Phenols, Waste treatment, Pollutant identification, Chemical analysis, Surveys.
Identifiers: *Ion exchange chromatography, *Chlorinated hydrocarbons, Synthetic sewage effluents, Chlorine residual, Characterization, Chemical concentration, Sample preparation, Cl-36, Chloramines, 2-Chlorobenzoic acid, 3-Chlorobenzoic acid, 4-Chlorobenzoic acid, 8-Chlorocaffeine, 6-Chloroguanine, 3-Chloro-4-hydroxybenzoic acid, 4-Chloromandelic acid, 4-Chloro-3-methylphenol, 2-Chlorophenol, 3-Chlorophenol, 4-Chlorophenol, 4-Chloropheylacetic acid, 4-Chlororesorcinol, 5-Chlorosalicylic acid, 5-Chlorouracil, 5-Chlorouridine, 8-Chloroxanthine, Dichloramine, Hypochlorite.

The major objectives were to develop a method for examining chlorination effects and to determine whether, as well as to what extent chlorine-containing organic compounds are formed when effluents from domestic sanitary sewage treatment plants are chlorinated at milligram-per-liter chlorine concentrations. An additional purpose was to characterize, or identify, and quantify stable chlorine-containing and other organic compounds in chlorinated and unchlorinated effluents. Chlorination yields were approximately the same for both primary and secondary effluents. Essentially the same effects were obtained by chlorination with either chlorine gas or hypochlorite solution. The effects of chlorination in the chlorinated effluents were determined by a method which coupled chlorination by Cl-36 radioactive tracer with separation by high-resolution anion-exchange chromatography using sensitive radioactive tracer monitoring. It was determined that chlorine-containing stable organic constituents are present after chlorination of effluents from domestic sanitary sewage treatment plants. Over 50 chlorine-containing constituents were separated from chlorinated secondary effluents. Seventeen of these chlorine-containing organic compounds were tentatively identified and quantified at the 0.5- to 4.3- microgram/liter level. In addition to the 17 chlorine-containing compounds that were identified, 32 stable organic constituents were identified and 23 of these were quantified at 2- to 190-microgram/liter levels in the effluents from domestic sanitary primary sewage treatment plants. Nine stable organic constituents were identified, and eight of these were quantified at 5- to 90-microgram/liter levels in the effluents from domestic sanitary secondary sewage treatment plants. (Holoman-Battelle)
W74-02416

MERCURY IN FISH, SEDIMENTS, AND WATER IN LAKE OAHE, SOUTH DAKOTA,
Environmental Protection Agency, Kansas City, Mo. Region VII.
For primary bibliographic entry see Field 05A.
W74-02423

TOXAPHENE ACCUMULATION IN FISH IN LAKES TREATED FOR ROUGH FISH CONTROL,
Wisconsin Univ., Madison.
R. A. Hughes, and G. F. Lee.
Environmental Science and Technology, Vol 7, No 10, p 934-939, October 1973. 4 fig, 2 tab, 26 ref.

Descriptors: *Pesticide residues, *Pesticide toxicity, Pesticide kinetics, *Pollutant identification, *Water pollution effects, Chemical analysis, Persistence, Water analysis, Water properties, Chlorinated hydrocarbon pesticides, Plankton, Fish stocking, Freshwater fish, Absorption, Rough fish, Physical properties, Chemical properties, Sunfishes, Path of pollutants, Walleye, Weight.
Identifiers: *Bioaccumulation, *Toxaphene, Fate of pollutants, Fat tissue, Sample preparation, Animal tissues, Electron capture gas chromatography, Thin layer chromatography, Fox Lake, Comstock Lake, Ottman Lake, Kusel Lake, Green sunfish, Biological magnification.

The results are presented of a study which covered the decline of toxaphene in treated lakes; the extent of toxaphene residue uptake by stocked fish; and the toxicity of 'aged' toxaphene residues compared to that of the standard mixture. Previously described methods for extracting, cleaning up and estimating toxaphene residues in aquatic samples were used. Electron capture gas chromatography was used to identify the pesticide and its presence in samples was confirmed by thin-layer chromatography. Fish, stocked in lakes retaining in the water very small amounts of toxaphene and plankton, accumulated residual toxaphene while maintaining excellent growth and reproducing successfully. Both stocked and hatched bluegills eliminated accumulated residues while maintaining excellent growth. Edible flesh of bluegills contained less than 10 percent of the whole body burden of toxaphene residues, and substantial portions of residues were removed by pan frying. Significant correlations were noted between accumulated toxaphene residue and fat content of stocked bluegills. Toxaphene and toxaphene residue accumulation were more closely related to fat content than to fish weight. Bluegills killed in lake treatment projects accumulated concentrations of toxaphene lower than concentrations of toxaphene residues found in stocked bluegills. Accumulated toxaphene in killed bluegills correlated well with fat content of the fish. Based on the changes in the toxaphene signature in gas chromatography, it is proposed that there is a partial degradation of some of the more toxic components of toxaphene. (Holoman-Battelle)
W74-02425

THE SPREADING OF HEAVY METALS IN FLOWING WATERS IN THE REGION OF OCCURRENCE OF NATURAL DEPOSITS AND OF THE ZINC AND LEAD INDUSTRY. (ROZPRZESTRZENIENIE METALI CIEZKICH W WODACH PLYNACYCH W REJONIE WYSTEPOWANIA NATURALNYCH ZLOZ ORAZ PRZEMYSLU CYNKU I OLOWIU),
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
For primary bibliographic entry see Field 05B.
W74-02435

THE INFLUENCE OF ORGANIC DECOMPOSITION ON CARBON DIOXIDE HYDROGEN SULFIDE, DISSOLVED OXYGEN, AND ALGAE GROWTH IN THE DWORSHAK RESERVOIR,
Idaho Univ., Moscow. Dept. of Bacteriology and Biochemistry.
A. J. Lingg.
Available from the National Technical Information Service as PB-226 252 $3.00 in paper copy, $1.45 in microfiche. University of Idaho, Moscow, Water Resources Research Institute Technical Completion Report, November 1973. 32 p, 15 fig, 1 tab, 12 ref. OWRR A-033-IDA (1).

Descriptors: Bacteria, *Carbon dioxide, *Decomposing, Water Quality, Reservoirs, Impoundment, *Hydrogen sulfide, *Idaho, *Dissolved oxygen, *Entroplication.
Identifiers: *Dworshak Reservoir (Ida), Clearwater River (Ida), Carbon prediction, *Algal growth.

In order to meet the increased demands on domestic, industrial and recreational water supply, it is necessary to maintain, and in many cases to upgrade, the quality of water resources. In order to accomplish these tasks, it is paramount to fully understand those factors, natural and artificial, which lead to accelerated deterioration of rivers, lakes and streams. Rampant eutrophication leading to massive algal blooms, anaerobic conditions and other undesirable qualities have been rapidly increasing for the last century. This project was designed to explore the role played by carbon and its subsequent use by bacteria on various chemical and biological parameters in Dworshak reservoir. Carbon contribution to the to the reservoir is primarily from the existing organic materials present on the preimpoundment floor. This study defines methodology enabling prediction of the levels of carbon in a reservoir prior to impoundment and explores some of the effects of that carbon. In addition, these methods can be used to determine the amount of leached carbon, readily useable, by heterotrophic bacteria. The effect of carbon utilization by bacteria on algal growth is also explored. In the laboratory this symbiotic effect leads to significant increases in algal biomass even at carbon levels as low as 1.3 ppm. The implication of this observation is that carbon can greatly stimulate algal growth rates and consequently algal blooms if made available by bacterial respiration.
W74-02444

MICROBIAL ND CHEMICAL STUDIES IN A WATERSHED USED FOR MUNICIPAL SUPPLY AND WASTE DISPOSAL,
Montana State Univ., Bozeman. Dept. of Microbiology.
W. G. Walter, and J. J. Jezeski.
Available from the National Technical Information Service as PB-226 240 $3.00 in paper copy, $1.45 in microfiche. Montana University Joint Water Resources Research Center Bozeman Report No. 41 (1973) 27 p, 12 fig, 6 tab, 12 ref. OWRR B-035-MONT (1).

Descriptors: *Microbiology, Pollution, Microenviron, ent, *Microorganisms, *Water quality, *Bioindicators, *Montana, Water pollution effects, Watershed management, Waste disposal, Municipal water.
Identifiers: *East Gallatin River (Mont.), Microbial studies.

The objectives of this research were: to determine the effects of recreational activities, wild life cloppings and logging on quality of water intended for municipal supplies; to evaluate the contribution of various factors to the wastewater burden of the East Gallatin River; to determine the survival indicator organisms under the various water conditions in the Bozeman Creek-East Gallatin water course; and to further the training of personnel in this type of research. (Holje-Montana)
W74-02449

WATER RESOURCES DEVELOPMENT IN THE MULLICA RIVER BASIN,
College of South Jersey, Camden. Dept. of Zoology.
J. B. Durand, L. Granstrom, and N. S. Rudolph.
Available from the National Technical Information Service as PB-226 239 $3.00 in paper copy, $1.45 in microfiche. Water Resources Research Institute, Rutgers-The State University of New Jersey, Report 20 p, September 1973. 4 fig, 1 tab, 4 ref. OWRR B-014-N.J (4), B-018-N.J., A-018-N.J. (4).

Descriptors: *Aquatic habitats, *Environmental effects, *Water supply development, *Conjunctive use, *Systems analysis, Aquatic environment, Estuarine environment, Ecology, Limiting factors, Water yield, Dependable supply, Groundwater, Potential water supply, Surface water availability, Linear programming, *Salinity, Streamflow, *New Jersey, Withdrawl.
Identifiers: *Mullica River Basin (NJ).

The potential withdrawal of water from the Mullica River-Great Bay Estuary in southern New Jersey prompted a joint study by biologists and engineers to determine the maximum supply of water that could be diverted from the basin without causing undue environmental impacts. The effect of removal of water from the basin over long periods of time was simulated by review of records of a severe drought. Based on analysis of streamflows and salinities during these drought conditions, minimum mean monthly streamflow were determined corresponding to the maximum salinities tolerable by the fish and shellfish communities, important sources of revenue and recreation in the region. A physically optimized, chance constrained linear programming model was developed for the conjunctive use of ground and surface waters. Adjusting water withdrawal from streamflow and groundwater sources according to physical and seasonal criteria would permit substantial use of the basins's resources, with no additional burden on the ecology of the estuary.
W74-02450

A STUDY OF THE FACTORS DETERMINING THE OXYGEN UPTAKE OF BENTHAL STREAM DEPOSITS,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Sciences.
J. V. Hunter, M. A. Hartnett, and A. P. Cryan.
Available from the National Technical Information Service as PB-226 238, $3.00 in paper copy, $1.45 in microfiche. Water Resources Research Institute, Rutgers The State University of New Jersey Report, October 1973. 27 p, 2 fig, 9 tab, 15 ref. OWRR B-022-NJ (7) 14-31-0001-3107.

Descriptors: *Benthos, *Benthic fauna, *Biochemical oxygen demand, Oxygen demand, Organic wastes, Pollutants.
Identifiers: *Benthal oxygen demand, Tubificid worms.

The object was to investigate different observed values of benthal oxygen demand and to determine their relationship to various conditions and circumstances. The study showed little correlation between the concentrations and nature of the benthic organics and the benthal oxygen damand of the deposit. However, there was a correlation between the benthic macro-invertebrate population (bubificid worms) and the benthal oxygen demand, which is also supported by some conclusions reached by other investigators. Although the mechanism of this demand is not clear, it seems that it is for larger than that which would be due solely to the respiration of the organisms. The high oxygen demand associated with the worm populations indicates why the present investigation and other researchers have failed to correlate benthal demand with the chemical composition of the deposits. If as it appears, the influence of the worms raises the demand to a level up to six times the demand without the worms, the relaively small difference in the demands caused by organic contents would not be obvious. (Whipple-New Jersey)
W74-02451

DEBRECEN AREA INLAND WATERS: HYDROBIOLOGICAL APPROACH: INFLUENCE ON WATER QUALITY OF MAIN EASTERN IRRIGATION CANAL WITH REFERENCE TO DEBRECEN'S DRINKING AND INDUSTRIAL WATER SUPPLY,
Lajos Kossuth Univ., Debrecen (Hungary). Zoological Inst.
G. Devai.
Arch Hydrobiol, Vol 70, No 2, p 206-209, 1972, Illus, English summary.
Identifiers: Canals, Cladocera, Copepoda, *Hungary (Debrecen), Hydrobiological studies, *Industrial water, Inland waters, *Irrigation canals, Rotatoria, *Water quality, Potable water.

The ecological and hydrobiological characteristics and the water quality of the inland waters along the Main Eastern Irrigation Canal (Keletifocsatorna) Hungary were examined. Their effect on the waters of the Canal was established through ecological (geographical, meteorological, hydrological, water-chemical, phytocenological) and zooplankton (Rotatoria, Cladocera, Copepoda) surveys.--Copyright 1973, Biological Abstracts, Inc.
W74-02543

CLEANLINESS OF WELLS, CHEMICAL SUBSTANCES IN DRINKING WATER AND THEIR RELATION TO CARIES (IN POLISH),
E. Wojtowicz, A. Macura, and R. Kwiatek.
Rocz Panstw Zakl Hig, Vol 23, No 1, p 15-21, 1972, English summary.
Identifiers: *Caries (Human), Chemicals, Cleanliness, *Water wells, Potable water, *Poland (Raba River valley), *Urochrome.

Two localities (A and B) lying in the Raba River Valley in Poland, were included in the study. In A, the prevalence of caries was 75%, but in B it amounted to 35% of the population. In locality A, 92% of the inhabitants had running water; in B, wells were the only source of drinking water. The water from wells was contaminated with urochrome, as judged from a high N content, large numbers of bacteria, and high O absorption. A relationship between urochrome contents in drinking water and the prevalence of caries was suggested.--Copyright 1973, Biological Abstracts, Inc.
W74-02544

ON MALLOMONAS LELYMEME HARRIS ET BRADLEY (CHRYSOPHYCEAE), (IN JAPANESE),
Kobe Univ. (Japan). Dept. of Biology.
For primary bibliographic entry see Field 02H.
W74-02550

THE EFFECT OF ORGANIC SUBSTRATES ON THE ABUNDANCE OF BACTERIA IN THE WATER OF 5 MASURIAN LAKES,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
W. A. Godlewsha-Lipowa.
Bull Acad Pol Sci Ser Sci Biol. Vol 20, No 9, p 647-651. 1972. Illus.
Identifiers: Abundance, *Bacteria, Lakes, Masurian lakes, Organic substrates, *Poland, Water pollution.

The effect of organic substances on the abundance of bacterial communities in water of a few Masurian lakes, Poland, of a varying trophism were examined. The population considerably increased after the addition of bactopepton. With increasing trophism, the percentage of the increasing bacterial number and the number of bacterial generations decreased. Due to the application of glucose and glucose with P, distinct stimulation of bacterial development was observed in lakes of a lower trophism, whereas starch visibly affected only Lake Sniardwy.--Copyright 1973, Biological Abstracts, Inc.
W74-02556

COMPARATIVE PRODUCTIVITY STUDIES OF THREE MECKLENBURG LAKES (LAKE KUMMEROW, LAKE TETEROW AND LAKE MALCHIN), (IN GERMAN),
Rostock Univ. (East Germany). Institut fuer Hygiene.
For primary bibliographic entry see Field 02H.
W74-02558

STUDIES OF THE SINKING PLUME PHENOMENON,
Argonne National Lab., Ill. Center for Environmental Studies.
B. Hoglund, and S. A. Spigarelli.
Paper presented at Fifteenth Conference on Great Lakes Research 1972, Madison, Wisconsin, April 5-7, 1972. 16 p, 6 fig, 9 ref.

Descriptors: *Wisconsin, *Thermal pollution, *Lake Michigan, Lakes, Fish management, Insect eggs, Water temperature, *Nuclear power plants, Heated water, *Water pollution sources, *Environmental effects.
Identifiers: Sinking plumes.

The phenomenon of a 'sinking plume' was observed during March and April, 1971, at the Point Beach Nuclear Power Plant, Two Creeks, Wisconsin. Temperature recorders were placed on the bottom of Lake Michigan near the outfall of the plant. Analysis of the data revealed the warm water did interact with the bottom as long as the lake temperature was 4C or less. When the ambient temperature exceeded 4C, there was little indication of temperature perturbations on the bottom as a result of the thermal discharge. The maximum Delta T observed at the nearest thermograph (335 meters) was 5.2C. The maximum Delta T observed at 1,525 meters from the discharge was 2.6C. Ambient temperatures at 1,525 meters from the discharge were observed to vary by 2C. The data are presented in terms of the percentage of time the various instruments were influenced by the thermal plume. Biological implications of the 'sinking plume' with respect to premature hatching of fish and insect eggs and with respect to the viability of young fish are discussed. (Sinha-OEIS)
W74-02644

RESEARCH PERTINENT TO ENVIRONMENTAL QUALITY CONCERNING THE PERIOD, 1967-1971.
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 02L.
W74-02648

5D. Waste Treatment Processes

TWO ENVIRONMENTAL ANALYSES INVOLVING AGRICULTURE,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 05B.
W74-02166

QUICK-TIME INSTRUMENTAL MEASUREMENTS OF WASTEWATER ORGANIC CHARACTERISTICS,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05A.
W74-02170

TREATMENT OF TANNERY EFFLUENTS BY PHYSICAL-CHEMICAL PROCESSES,
Calspan Corp., Buffalo, N.Y.
L. K. Wang, D. B. Dahm, R. E. Baier, and R. C. Ziegler.
Technical Paper presented at the 45th Annual Conference of the Water Pollution Control Federation, Atlanta, Georgia, October 1972. 36 p, 9 tab, 5 fig, 14 ref.

Descriptors: *Waste water treatment, *Tannery wastes, *Foam separation, Colloids, *Flotation, Carbon, *Adsorption, Surfactants, Suspended solids, Industrial wastes.
Identifiers: Surface adsorption.

A new unit process, adsorption-flotation, was found efficient for removing both dissolved organics and suspended solids. High removal was achieved by using powdered activated carbon to

adsorb most of the dissolved organic molecules in an aeration column containing tannery waste, then using a surfactant as a collector to remove residual organics, activated carbon, and other solid particles with rising bubbles. With the adsorption flotation followed by sedimentation, the fractional reductions of suspended solids, turbidity, color, protein, tannin, cyanide, and chemical oxygen demand were found to be all in excess of 0.9. Reductions of sulfide and chromium by pH adjustments with sulfuric acid and lime, respectively, were also demonstrated experimentally. The new adsorption flotation process could be a potential method for treating many industrial effluents; however, it is economically unfeasible for treating tannery waste.
W74-02175

MATHEMATICAL RELATIONSHIPS OF BOD REMOVAL IN ACTIVATED SLUDGE PROCESS,
Calspan Corp., Buffalo, N.Y.
L. K. Wang, and M. H. Wang.
Civil Engineering Bulletin, National Cheng Kung Univ., Volume 10, May 1969, p 81-85.

Descriptors: *Waste water treatment, *Activated sludge, Mathematical models, *Biochemical oxygen demand, Recycling, Kinetics, *Sludge treatment.
Identifiers: Complete mix, Batch system, Continuous system, Sludge recycle, Sludge yield.

Kinetics of completely mixed activated sludge process were reviewed, assessed and summarized. Based on the materials balances for the substrate and the sludge in an activated sludge reactor, the mathematical equations of substrate removal rate, sludge growth rate, and critical dilution rate can be derived for a continuous activated sludge process with or without recirculation. The behavior of an activated sludge continuous flow system can be logically predicted for any combination of initial substrate concentration, volumetric feedback ratio, cell concentration factor, and dilution ratio if the maximum sludge growth rate, the cell yield coefficient, and the saturation constant are known.
W74-02176

COST EFFECTIVENESS IN POLLUTION CONTROL--TREATMENT OF GLUE FACTORY WASTES BY CARBON ADSORPTION SYSTEM,
Calspan Corp., Buffalo, N.Y.
L. K. Wang, R. P. Leonard, D. B. Dahm, R. C. Ziegler, and R. E. Baier.
Proceedings of the Fifth Annual Northeastern Regional Antipollution Conference, University of Rhode Island, R.I., 1972. p 87-114. 10 tab, 4 fig, 10 ref.

Descriptors: Estimated costs, Costs, *Waste water treatment, Activated carbon, Adsorption, Coagulation, Industrial wastes, Physiochemical properties.
Identifiers: Powdered carbon, Organic coagulant, Dissolved protein, Glue factory wastes.

In an animal glue plant, the two waste streams of greatest concern are the alkaline waste containing ime, protein, blood, and dirt from the lime curing nd washing operations, and the acid waste conaining sulfuric acid, chromium sulfate, dissolved rganics, and hydrochloric acid from the acid reatment, washing, and neutralization operations. There has been little success in developing dequate and economical methods for the abatenent of glue factory pollutant discharges. A twotage powdered carbon adsorption system dosing ,000 mg/l of carbon for each stage would satisfy he present New York effluent standards. The econdary treatment cost would be about 30 cents er thousand gallons (or about $900 per day). If a ertiary sand filtration process is included, there ould be an additional 10.1 cents per thousand galns (or about $300 per day) cost.
W74-02177

IN SITU TREATMENT METHODS FOR HAZARDOUS MATERIAL SPILLS,
Calspan Corp, Buffalo, N.Y.
R. C. Ziegler, and J. P. Lafornara.
Proc. of National Conference on Control of Hazardous Material Spills, March 1972. 49 p, 10 fig, 9 tab. EPA 68-01-0110.

Descriptors: Lakes, *Waste water treatment, *Carbon, *Adsorption, *Flotation, Neutralization, Chemical precipitation, *Heavy metals, Ammonia, Chlorine, Activated carbon.
Identifiers: Organic pollutants, Granular carbon, Sodium sulfide, *Hazardous materials spills.

Several methods for coping with water and land spills of hazardous materials are discussed. For water spills of heavy metals, treatment with sodium sulfide to form a sulfide precipitate is described. Laboratory and field data are presented which illustrate the general utility of this method. Methods are suggested for neutralizing spills of ammonia and chlorine. For treating water spills of certain organic pollutants and heavy metal salts, adsorption by activated carbon is shown to be promising. Data are presented on the effects of pollutant concentration on carbon adsorption efficiency. Flotation techniques for retrieving powdered activated carbon from the treated water are described, and the use of granular activated carbon in porous bags is considered as a means for overcoming the disadvantages of introducing carbon directly into the bulk water. Methods are available for controlling land spills of hazardous materials by treating the ground surface to prevent penetration and by gelling or congealing spilled liquids to immobilize them.
W74-02179

WATER AND SEWERAGE IMPROVEMENTS NEEDED IN 1975 IN CHATHAM COUNTY, GEORGIA.
Chatham County-Savannah Metropolitan Planning Commission, Savannah, Ga.

February 1970. 115 p, 28 fig, 2 tab. HUD P-128, Urban Planning Grant.

Descriptors: *Planning, *Construction costs, Water supply, Water distribution, Waste water disposal, *Sewerage, Grants, *Georgia.
Identifiers: Urban water resource systems, Utility extensions, *Savannah (Geo), Chatham County (Geo).

Specific water supply and sewerage system improvements and their costs for Chatham County are presented. The report is the third in a series of planning studies which included a general program of water pollution abatement and water service extension for the county. The emphasis is on the specific costs and means of payment for each proposed improvement in each service area. Most of the report consists of tables listing the improvements and their costs. Some of the means for payments proposed are HUD grants, FWPCA grants (now EPA), and revenue bonds. The tables of improvements are organized to show which elements are eligible for federal grants. The report covers the period 1970 to 1975. (Elfers-North Carolina)
W74-02186

THE USE OF POWER PLANT HEAT IN A PHYSICAL-CHEMICAL DOMESTIC WASTEWATER RENOVATION SYSTEM,
Arizona Univ., Tucson. Dept. of Civil Engineering and Engineering Mechanics.
R. A. Sierka, and R. A. Fazzolare.
Available from NTIS as PB-226 141 $3.75 in paper copy, $1.45 in microfiche. Paper presented at National Conference on Complete Water Reuse, April 23-27, 1973, Washington, DC. Sponsored by American Institute of Chemical Engineers and Environmental Protection Agency. 28 p, 12 fig, 4 tab, 5 ref. OWRR-A-028-ARIZ (1). 14-31-0001-3503.

Descriptors: *Waste water treatment, *Sewage treatment, Reclaimed water, *Nuclear powerplants, Heated water, *Thermal pollution, Recycling.
Identifiers: *Heated sewage.

Seventy percent of the energy produced in a nuclear power reactor is rejected to the environment as low quality waste heat. One possible use of this heat source is for domestic wastewater treatment. This study examines a ferric-chloride, powdered activated carbon physical-chemical system in a one-step process as a function of temperature (20 deg-80 deg C) with COD, suspended solids, turbidity, and phosphorus removals used to monitor performance. Significant improvement in removal is obtained at higher temperatures with optimum results between 50 deg C and 60 deg C. Since urban wastewater flow and electric power usage are population-dependent and the system optimum treatment temperature coincides with waste heat characteristics, a combined power plant-wastewater system would generate recycleable water.
W74-02208

OPTIMUM DESIGN PERIOD FOR WATER POLLUTION CONTROL PLANTS,
H. C. Blersch.
Journal of the Institute of Water Pollution Control, Vol 72, No 2, p 223-226, 1973. 1 fig, 1 tab.

Descriptors: *Water pollution control, *Treatment facilities, *Design, *Long-term planning, *Evaluation, Economics, Capital, Investment, Decision making, Optimal development plans.
Identifiers: Ultimate design period, Stage design period, *South Africa.

This article extends the conclusions drawn by Zeperin in his contribution to the IAWRR Design Workshop in Vienna in 1971, concerning the optimum design period for water pollution control plants, by examining a series of hypothetical situations to determine whether any rule can be established which has a general application in the divergent conditions found in the South African context. The implication of long-term provision in basic planning varies widely among different situations, thus barring a quantitative generalization. Required essentially is that the implications be identified and evaluated as far into the future as possible, since the longer-term consequences of faulty, short-sighted planning may easily be out of all proportion to the immediate cost differences. Considered herein in detail are: (1) the ultimate design period, or life, of a plant which the designer should anticipate and provide for; and (2) the stage design period, the period for which the given stage of the works should be designed to serve before an extension becomes necessary. It is concluded that each case should be examined on its own merits, and in such examination it will be important that estimated costs for modules of various sizes and for basic and re-establishment costs are of relatively high accuracy in relation to one another. (Bell-Cornell)
W74-02222

COST EFFECTIVENESS OF CURRENT ENVIRONMENTAL ENGINEERING PRACTICES,
Camp, Dresser and McKee, Boston, Mass.
R. C. Marini.
Water and Sewage Works, Vol 120, No 4, p R-21-R-28, April 1973.

Descriptors: *Environmental engineering, *Water pollution control, *Economic efficiency, *Optimum development plans, Costs, Mathematical models, Computer programs, Water quality, Dissolved oxygen, Construction, Management, Industrial wastes, Surveys, Systems analysis.
Identifiers: *Cost-effectiveness, Social benefits.

Large public sums will be spent on water pollution control, thus it is imperative to look at the cost effectiveness of current practices in environmental engineering. The most effective way to minimize costs is to plan and compare the costs and functional effectiveness of all available alternatives, including some alternatives that involve social and political considerations which may not be completely effective. The eight principal steps involved in developing optimum solutions to environmental engineering problems are given. Pilot plants, computers and mathematical models, industrial waste surveys, and construction management, four practices which are useful tools in implementing the principal steps, are discussed and case examples of their application are described. Pilot plant studies are conducted as a means for developing design factors and optimizing total costs for ultimate full-scale plants. A systems method relating cost to water quality has been derived, comprised of an economic, dissolved oxygen model and two computer programs (mixed integer and simulation). Industrial waste surveys are effective cost-saving tools for collecting data, in view of the increasing use of computers. Finally, the consulting engineer for, a wastewater treatment project should be its construction manager since he most freely and objectively can select the most economic and efficient equipment and practices. (Bell-Cornell)
W74-02225

MANUFACTURE OF CAPACITOR PAPER -- SOME PROBLEMS WITH FRESH WATER PREPARATION, (ERZEUGUNG VON KONDENSATORPAPIER -- EINIGE PROBLEME BEI DER FRISCHWASSERHERSTELLUNG),
O. Riessner.
Zellstoff und Papier, Vol 21, No 7, p 200-204, July 1972. 5 tab, 1 fig, 7 ref.

Descriptors: *Waste water treatment, *Industrial waters, *Ion exchange, *Pulp and paper industry, Freshwater, Demineralization, Ions, Cations, Anions, Anion exchange, Cation exchange, Water purification, Desalination, Resins, Water properties, Electrical conductance, Electric insulation, Conductivity, Capacitors.
Identifiers: *Condenser paper, *Capacitor paper, Dielectric properties, Dielectrics.

Because of presence of electroconductive cations and anions in the process water would impair the dielectric properties of capacitor and condenser papers, they must be removed as much as possible from the water supply of paper mills, along with suspended and dissolved solids in general. The water-treatment installation of an insulating paper mill must be designed on the basis of available water characteristics. Most installations in condenser paper mills comprise two stages, viz., a conventional treatment and a deionization stage. The latter involves passing the process water through a series of columns filled with cation- and anion-exchange resins. The resins used must possess high chemical, thermal, and mechanical resistance. Some typical examples are tabulated, along with the respective achievable minimum specific water conductivities and other desirable characteristics of the treated waters. (Speckhard-IPC)
W74-02247

USE OF FIBROUS MATERIALS FOR REMOVAL OF IRON AND IRON COMPOUNDS FROM THERMOELECTRIC POWER PLANT WATER AND CONDENSATES, (IZPOLZUVANE NA VLAKNEST MATERIAL ZA ULAVYANE NA ZHELEZO I ZHELEZNI SUEDINENIYA OT VODITE I KONDENZATITE NA TETS),
Z. Litovski, G. Litovska, and P. Boevska.
Tseluloza i Khartiya, Vol 3, No 6, p 14-17, Nov./Dec., 1972. 3 tab, 5 fig, 6 ref.

Descriptors: *Waste water treatment, *Pulp wastes, Water purification, *Boiler feed water, *Filters, *Fibrous beds, Iron, *Iron compounds, Demineralization, Pulp and paper industry, Retention, *Industrial water, Filtration, Hydration, Colloids, Dissolved solids, Clogging, Water treatment, Pressure.
Identifiers: Pulps, Kraft pulps, Sulfite pulps, Groundwood pulps, Semichemical pulps, NSSC (Neutral sulfite semichemical) pulps, Bleached pulps, Beating degree, Freeness, Fibrillation, Condensates.

In the purification of boiler feed waters and condensates, ion-exchange resins will not retain colloid particles and are readily clogged. These difficulties can be overcome by using pulps and similar fibrous materials as iron-retaining filters. When such fiber mats, which must be 3-10 mm thick, become saturated, they need not be regenerated, but can be disposed of. The Fe-retaining capacity of several pulp types (groundwood, neutral sulfite semichemical, bleached softwood kraft, and bleached softwood sulfite pulps) was investigated and was found to vary with the nature of the fibers, the filtration pressure, and the pulp 'freeness' (a measure of drainage or filtration resistance). High filtration rates lowered the retention of total, soluble, and colloidal Fe, whereas high 'beating degrees' (fibrillation and hydration) increased the Fe retention. Among the pulps tested, bleached sulfite pulp showed the best retention, viz., 72.5, 69.3, and 75% of total, dissolved, and colloidal Fe, respectively. (Stapinski-IPC)
W74-02251

HYLTE BRUK: NEWSPRINT AND ENVIRONMENTAL PROTECTION, (HYLTE BRUK: ZEITUNGSDRUCKPAPIER AND UMWELTSCHULTZ).

Das Oesterreichische Papier, Vol 9, No 7, p 23, 25-27, July 1972. 1 tab, 1 illus.

Descriptors: *Pulp wastes, *Waste water treatment, Pollution abatement, Pulp and paper industry, Europe, *Industrial wastes, Filtration, Coagulation, Sedimentation, Biological treatment, Flocculation, Waste treatment, Treatment facilities, Chemical precipitation.
Identifiers: *Sweden, Newsprint, Paper machines, White water, Groundwood mills, Newsprint mills, Pulp mills, Paper mills, *Environmental protection, *Combined treatment.

Hylte Bruks AB. in Sweden originally manufactured sulfite pulp and paper since 1907, but was taken over in 1970 by an association of 4 Swedish and 1 German company and expanded and converted to the production of groundwood and newsprint, in addition to building boards, partly in order to reduce water and air pollution problems. The old sulfite mill switched, for similar reasons, from Ca to Mg base cooking liquor. In addition to noise control, the expanded facilities provide for improved waste water treatment in a modern clarifier installation which permits no toxic matter to be discharged into the Nissan River. The newspaper machine's white water is being treated in four stages involving filtration, chemical flocculation plus sedimentation, biological oxidation with activated sludge, and chemical precipitation. The combined installation reduced the effluent BOD from 34 to 6 tons/day, the discharge of suspended solids from 16 to 2 tons/day, and the discharge of lignin from 78 to 3 tons/day. Partly as a result of closing the still operating pulp bleachery, a further reduction of BOD to 4.5 tons/day is expected by 1975. Of the total capital invested in the expanded production, namely 255 million Swedish Crowns, ca. 10% was spent on environmental protection measures. (Speckhard-IP)
W74-02256

WASTE WATER RESEARCH FOR THE PULP AND PAPER INDUSTRY AT THE DARMSTADT TECHNOLOGICAL INSTITUTE (ABWASSERFORSCHUNG FUER DIE PAPIER-UND ZELLSTOFFINDUSTRIE AN DER TH DARMSTADT),
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
W. Brecht.
Das Oesterreichische Papier, Vol 9, No 7, p 15-19, July 1972. 1 tab, 4 fig, 26 ref.

Descriptors: Foreign research, *Waste water treatment, *Pulp wastes, Water conservation, Research facilities, *Pulp and paper industry, Europe, *Industrial wastes, Effluents, Sludge disposal, *Sludge treatment, *Recycling, Pollution abatement, Water pollution sources, Water pollution treatment, Freshwater, Research and development, Research priorities, Dewatering, Pulp wastes, Bibliographies, Suspended solids.
Identifiers: *Germany, White water, Chemical recovery, Fiber recovery, Papermaking.

The Research Center for Water and Waste Water (WAF) of the Institute for Paper Manufacture at the Technological Institute in Darmstadt pursues research studies in the following areas: Biological, chemical, and physico-mechanical treatment of paper industry effluents; recycling of aqueous effluents for minimization of freshwater consumption in paper mills; recovery of fibers, fillers, and other papermaking additives from paper machine white water for improved process economy and waste water clarification; and dewatering and disposal of sedimented effluent sludges. A bibliography of technical reports published by WAF between 1957 and 1970 is appended. The ecological significance of these investigations is pointed out and discussed in historical perspective, and problems awaiting further developments are indicated. (Speckhard-IPC)
W74-02257

PURIFICATION OF EFFLUENTS BY MEANS OF REVERSE OSMOSIS, (OCHISTKA STOCHNYKH VOD METODOM OBRATNOGO OSMOSA),
Yu. I. Dytnerskii, R. G. Kocharov, G. V. Makarov, and V. A. Minaev.
Khimiya Promyshlennost', Vol 47, No 12, p 895-899, 1971. 5 tab, 2 fig, 43 ref.

Descriptors: *Reverse osmosis, Pollution abatement, *Waste water treatment, *Treatment facilities, *Economic feasibility, *Industrial wastes, Liquid wastes, Effluents, Efficiencies.

A general review is presented of the principles, effectiveness, economics, and equipment involved in the treatment of industrial aqueous effluents by reverse osmosis. (Chern-IPC)
W74-02258

SODIUM RECOVERY FROM A PULP MILL WASTE EFFLUENT BY ION EXCHANGE,
Himsley Engineering Ltd., Toronto (Ontario).
A. Himsley.
Ion Exchange and Membranes, Vol 1, No 1, p 51-56, 1972. 4 fig, 4 ref.

Descriptors: *Pulp wastes, Water pollution control, Pollution abatement, *Waste water treatment, Treatment facilities, *Ion exchange, Automatic control, *Sulfite liquors, *Sodium compounds, Pulp and paper industry, Water pollution sources, Canada, Effluents, Neutralization, Sulfuric acid, Sodium hydroxide, Alcohols.
Identifiers: Vanillin, Sulfite alcohol, Spent sulfite liquor, Ethanol (or Ethyl alcohol), *Chemical recovery, Sodium sulfite, Spent liquors.

The sulfite pulp mill of Ontario Paper Co. in Thorold, which uses sodium-base sulfite cooking liquor, produces also 95% ethyl alcohol (sulfite alcohol) and vanillin from its spent sulfite liquor. Maximum vanillin production requires excess caustic which, in turn, consumes 50 tons per day

of sulfuric acid for waste stream neutralization. In order to recover the large volume of sodium-base chemicals from the effluent, a complicated ion-exchange system utilizing the fixed-bed technique was developed and scaled up into a fully automated commercial installation, in which the need for specially trained operators was obviated by built-in logic circuitry and simple alarm systems. (Witt-IPC)
W74-02259

CHARACTERIZATION AND TREATMENT OF FISH PROCESSING PLANT EFFLUENTS IN CANADA,
Department of the Environment, Ottawa (Ontario).
K. Shikaze.
Technology Development Report EPS 4-WP-73-2, June 1973. 44 p, 24 tab, 8 fig, 19 ref.

Descriptors: *Industrial wastes, Fish handling facilities, *Pollution abatement, *Waste water treatment, Effluents, Economic feasibility, Fish types, Treatment facilities, *Food processing industry, *Canada.
Identifiers: Fish oil, Fish meal, *Fish processing wastes.

Five studies on fish-rendering wastes are summarized as technology background for the development of pollution-control guide lines in the fish-processing industry. They deal with the characteristics and treatability (by physical and biological methods) of effluents from the processing of redfish, sole, flounder, halibut, salmon, herring, shellfish, lobster, crab, and related freshwater and estuarial sources of fish meal, protein, and oil. Economic data (cost and profit figures) are included. (Brown-IPC)
W74-02262

EFFLUENT TREATMENT AT MAN-MADE FIBRE PRODUCTION UNITS,
Courtaulds Ltd., Coventry (England). Research Div.
T. R. Jones.
Effluent and Water Treatment Journal, Vol 12, p 352-355, 1972.

Descriptors: *Textiles, *Industrial wastes, *Waste water treatment, Water pollution control, *Pollution abatement, *Water pollution sources, Effluents, Waste treatment, Activated sludge, Biological treatment, Microorganisms, Bacteria, Color, Toxicity, Pollutants, Cellulose, Sulfates, Sulfur compounds, Sulfur bacteria, Zinc, Carbohydrates, Ion exchange, Sulfides, Dye releases, Dyes, Recycling, Monitoring.
Identifiers: *Synthetic fibers, Hemicelluloses, Cyanides, Viscose rayons, Viscose process, Zinc sulfate, Zinc compounds, Dissolving pulps, Carbon disulfide, Spinning, Washing, Chemical recovery, Plating, Carbon fibers, Sulfuric acid, Spent liquors.

Most textile fiber production technologies involve dry processes, such as the spinning of acetate, acrylic, polyamide, polyester, and glass fibers, thus causing no effluent problems. Others give rise to effluents that are conveniently treatable by biological methods, such as wet spinning and fiber washing wastes. Removal of cyanide is necessary with steel tire cords which require brass plating, and with carbonized fibers which emit hydrogen cyanide. The oldest and most important man-made fiber, viscose rayon, consumes large amounts of water and requires sodium hydroxide, carbon disulfide, zinc sulfate, and sulfuric acid as major chemicals in the mercerization, xanthation, ripening, cellulose regeneration, coagulation, and spinning stages. Process economy, and environmental protection call for optimum chemical recovery, as well as for effluent treatment to remove BOD-consuming hemicelluloses originating from the wood pulp (mostly spruce and eucalyptus). Zinc sulfate, which is toxic and most objectionable, can be removed from effluents by ion-exchanged resins and/or reaction with sodium hydroxide after preliminary neutralization with calcium hydroxide. Sulfide-bearing alkaline spent liquors are conventionally treated with Thiobacillus thiooxidans, using the activated sludge technique. Correct choice of fiber dyes and pigments permits closed-circuit operation and avoidance of colored effluents. Accidental spills must be prevented by careful storage of chemicals, installation of traps, and well-planned effluent monitoring and safe factory housekeeping practices. (Witt-IPC)
W74-02263

REMOVAL OF ORGANIC MATERIAL BY ADSORPTION ON ACTIVATED CARBON,
Chemviron S.A., Brussels (Belgium).
R. A. Davies, H. J. Kaempf, and M. M. Clemens.
Chemistry and Industry, No. 17, p 827-831, September 1,1973. 1 tab, 8 fig, 4 ref.

Descriptors: *Water treatment, *Waste water treatment, *Activated carbon, *Sewage treatment, Tertiary treatment, Treatment facilities, Industrial wastes, Pollution abatement, Color, Odor, Taste, Pollutants, Effluents, Operating costs, Costs, Potable water, Industrial water, Irrigation water, Toxicity, Incineration, Granules, Particle size, Adsorption, Water reuse.
Identifiers: *Lake Tahoe (Calif-Nev).

Activated carbon has found widespread use for prepurification of potable and industrial waters and treatment of municipal and industrial waste waters, not only for removal of color, taste, and odor, but also for prevention of pollution by pesticides and other biodegradable and nondegradable organics in general. The physical principles of adsorption on carbon particles and beds are reviewed, and some process engineering considerations are discussed, including costs of granular carbon reactivation, justification of combustion furnaces, and relative merits of powdery vs. granular carbons. The first full-scale application of granular carbon for tertiary treatment was at Lake Tahoe, where aeration tank effluent is passed through eight parallel adsorbers to reclaim daily 28,000 cu m of irrigation water. At Windhoek, South Africa, potable water is recovered from sewage in a plant processing 200 cu m/hr. Three typical industrial installations where granular carbon finds use in removal of toxic and colored effluent components include a Swiss explosive factory, a herbicide factory on the U.S. West Coast, and a carpet mill in Pennsylvania. (Brown-IPC)
W74-02264

REMOVAL OF ORGANIC MATTER FROM WATER BY RESINOUS ADSORBENTS,
Bayer A. G., Leverkusen (West Germany).
C. Oehme, and F. Martinola.
Chemistry and Industry, No 17, p 823-826, September 1, 1973. 3 tab, 4 fig, 2 ref.

Descriptors: *Waste water treatment, Water treatment, *Ion exchange, *Anion exchange, *Humic acids, Lignins, Pores, Porosity, *Resins, Fouling, *Detergents, Pollutants, Separation techniques, Industrial wastes, Liquid wastes, Adsorption, Dyes, Metals, Surfaces, Sulfonates, Water reuse, Recycling, Organic matter.
Identifiers: *Lignosulfonic acids.

Weakly basic anion exchangers having a surface area of 40-80 sq m/g and an average pore diameter of 300-500 Angstrom are especially suitable for demineralization of waters polluted by humic and lingnosulfonic acids and anionic detergents. Strongly basic macroporous organic scavengers can be used to remove humic acids from water and waste water, provided the resins are not fouled by anionic detergents. Special macroporous adsorber resins can remove nonionic detergents from rinse water of metal plating shops. Various types of resinous adsorbents should also be considered for treating and recycling waste waters of dye works. (Brown-IPC)
W74-02266

REDUCTION OF BOD AND PHOSPHATE BY CHEMICAL PRECIPITATION. UTILISATION OF SLUDGE,
Uhde (Friedrich) G.m.b.H., Dortmund (West Germany).
E. Hosenfeld, and W. Liebig.
Chemistry and Industry, No 12, p 565-567, June 16, 1973. 1 fig.

Descriptors: *Sludge treatment, Aluminum, *Phosphates, Sewage treatment, *Coagulation, Sulfates, Calcium, Metals, Deionization, Viruses, *Biochemical oxygen demand, Aquatic microorganisms, Fertilizers, Dewatering, Drying, Costs, Operating costs, Capital costs, Public health, Incineration, Europe, *Chemical precipitation, *Waste water treatment.
Identifiers: *Aluminum sulfate, Precipitants, Coagulants, Sweden.

Aluminum sulfate is an excellent precipitant which is used in over 90% of the 300 Swedish sewage-treatment installations. It removes not only phosphate detergents threatening eutrophication of lakes, but also BOD-consuming organic compounds, metallic and other ions, and pathogens, notably viruses. Precipitation can be performed in four modes, viz., direct, preliminary, simultaneous, or final precipitation. The latter gives the best results, i.e., 95% removals of BOD and phosphate. Although virus removals of 99.0-99.9% can be achieved, the clarified sludge must not be reused as fertilizer without pasteurization. Coprecipitation in the presence of calcium, i.e., under neutral conditions, will remove most metals in true solution around pH 7. Metering station with silo and dissolving equipment for granular aluminum sulfate (costing ca. 13 British pounds/ton in Sweden) may require a capital investment of 4,000 to 20,000 British pounds. Total capital plus operating costs for chemical precipitation are estimated at 0.005-0.01 German Marks per inhabitant per day. Effluent purification by final precipitation requires 10% more capital than biological treatment and ca. 25% higher total cost. Sludges can be treated in three different ways: (1) aerobic stablization and drying, (2) anaerobic stabilization in towers plus dewatering, and (3) mechanical dewatering and incineration. Precipitated sludge can find uses as soil fertilizer, bacterial culture medium, supplementary animal fodder (after proper treatment), and raw material for recovery of elementary phosphorus by a Danish patented thermocraking process. (Brown-IPC)
W74-02267

ION EXCHANGE AND ALLIED PROCESSES IN WATER RECOVERY,
Permutit Co. Ltd., London (England).
J. E. Goddard.
Chemistry and Industry, No 12, p 563-565, June 16, 1973. 2 fig, 2 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Economic efficiency, *Cost analysis, *Reverse osmosis, *Electrodialysis, Water treatment, Operating costs, Costs, Cost comparison, Capital costs, Electric power, Membrane processes, Membranes, Water reuse, Water quality, *Ion exchange.
Identifiers: Hollow fibers, Ion exchangers, Reverse osmosis modules.

The operating principles, applications, and capital and operating costs of ion exchange, electrodialysis, and reverse osmosis are compared. The cost of ion-exchange installations varies between 400 and 1000 British pounds per cu m/hr of water treated,

depending on number and size of resin beds required and on flow rate, feed concentration, resin combination, cycle time, operating pressure, construction materials, and degree of automation. Although power costs for electrodialysis can be estimated from Faraday's law, polarization effects tend to increase them in practice, as does the need for acid dosing to prevent scaling in dialysis cells. Various types of osmotic membrane systems are now available, the latest development being Du Pont's hollow-fiber polyamide module with outside-to-inside passage of water. Operating costs are divided between power demand and membrane amortization. Commercial systems operating at 28 or 42 kg/sq cm (400 to 600 psi) consume ca. 2.6 kw-hr/cu m of treated water; membranes guaranteed to last 3 yr come to 0.03 British pound/cu m of trated water. The choice among these three treatment processes depends on numerous variables and economic considerations, including the desired treated water quality. These factors are discussed in some detail. (Brown-IPC)
W74-02268

IN-PIPE WASTEWATER CLEANUP.

Chemical Engineering, Vol 80, No 22, p 32, 34, Oct. 1, 1973. 1 fig.

Descriptors: *Sewage treatment, *Waste water treatment, *Pressure conduits, *Activated sludge, *Oxygenation, Pipelines, Recycling, Water reuse, Irrigation water, Fermentation, Oxygen, Aeration, Biochemical oxygen demand, Monitoring, Engineering structures, Injection, Suspended solids, Filtration, Separation techniques, Liquid wastes, Chlorination, Flotation, Sludge, *California.
Identifiers: *Pressure pipe treatment.

Encouraging results, notably capital cost savings of nearly 40%, are reported for the Pressure Pipe Treatment (PPT) of sewage and industrial wastes developed and funded by the Irvine Ranch Water District, Irvine, California, after four years of laboratory and pilot studies. The patented system combined purification of waste waters via activated sludge fermentation with long-distance (about 6.5 miles) conveying of treated water to the reuse site. The PPT flow scheme involves an initial high-rate screening step to separate solids which are then ground and sent to an aerobic sludge activator, in which the detention time for maximum activation (3-4 days) is shorter than for complete digestion. Activated sludge is then combined with the liquid portion of the sewage inside the pipeline, with facilities for en-route injection of air or oxygen and on-line BOD monitoring. For forest irrigation and similar applications, the pipeline effluent can be used directly; otherwise, an air flotation separator will remove sludge, some of which is recycled as seed material through existing regional waste-collection sewers, and the balance is used for soil conditioning. The sludge-free water is treated in a sand filter for further removal of suspended solids and BOD reduction. Some reclaimed water may be chlorinated or subjected to other final processing, such as nitrogen removal, before reuse. The main advantage of PPT is its nearly 100% utilization of the oxygen supplied, in contrast to the 6% efficiency of conventional secondary treatments. Popeline flow rates of 0.5 to 6.0 ft/sec are envisioned, along with pipe residence times as short as 1 hr. (Brown-IPC)
W74-02269

DRY ACTIVATED SLUDGE AS FERTILIZER FOR WINTER WHEAT AND CORN, (SUKHOI AKTIVNYI IL KAK UDOBRENIE DLYA POSEVOV OZIMI PSHENITS' I KUKURUZ'),
L. G. Tsvetkova, and L. S. Miroshnichenko.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', Vol 25, No 3, p 18-20, 1972. 6 tab.

Descriptors: *Activated sludge, *Sludge disposal, *Soil disposal fields, *Fertilizers, Nitrogen compounds, Phosphorus compounds, Farm management, Agricultural chemicals, Chlorophyll, *Corn (Field), Cereal crops, *Wheat, Field crops, Effluents, Waste water treatment, Hydrolysis, Yeasts, Industrial wastes, Proteins, Waste disposal, Chemical industry.
Identifiers: Carotene, Wood hydrolysis, Hydrolyzates, Hydrolysis industry.

Agricultural farm plots were treated, prior to the sowing of winter wheat and corn, with 40 kg/ha of a nitrogen-phosphorus mineral fertilizer in comparison with 1 ton/ha of dried activated sludge obtained from the effluent-treatment plant of the Zaporozhe hydrolysis and yeast factory in the USSR. Both types of fertilizer produced similar increases in leaf chlorophyll and carotene and in grain protein contents over unfertilized control plots, but the activated sludge induced higher crop yields compared to the conventional fertilizer. (Stapinski-IPC)
W74-02270

EXPERIENCE WITH THE OPERATION OF PURIFICATION EQUIPMENT, (OPYT EKSPLUATATSII OCHISTNYKH SOORUZHENII),
Tavdinskii Gidroliznyi Zavod (USSR).
P. G. Pavlos, A. E. Norina, L. V. Korenyuk, and F. G. Kardash.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', Vol 25, No 6, p 21-23, 1972. 2 tab.

Descriptors: *Waste water treatment, *Industrial wastes, *Water pollution sources, *Treatment facilities, Chemical industry, Wood wastes, Hydrolysis, Yeasts, Sedimentation, Filtration, Aeration, Fermentation, Waste treatment, Biochemical oxygen demand, Chemical oxygen demand, Carbohydrates, Mixing, Effluents, Water pollution, Pollutants.
Identifiers: Hydrolysis industry, Hydrolyzates, Mixers, Wood hydrolysis, Furfural, *USSR (Tavda).

In 1970, the Tavda hydrolysis factory (USSR) installed an effluent treatment system simultaneously with the startup of a yeast production facility for the processing of wood hydrolyzates. Effluents from the fermentation and yeast-cultivation operations are passed through sand filters and primary sedimentation tanks, then purified with aerated biological filters and subjected to a secondary sedimentation. The process removes about 60% of the five-day BOD and 80% of the COD (in terms of permanganate-oxidizable matter). Because neither the purification degree nor the capacity of the treatment facilities is sufficient to avoid discharging considerable portions of the effluent into the river without purification, additional equipment installations are being planned, along with process modifications. Residual fermentation liquor will be reused to prepare nutrient salts and to dilute the nutrient medium. A milder hydrolysis process is contemplated to reduce the undesirable degradation of fermentable sugars. A mixer is to be installed to accelerate the decomposition of furfural (which interferes with the yeast fermentation). (Stapinski-IPC)
W74-02272

(TAPPI) ENVIRONMENTAL CONFERENCE, MAY 14-16, 1973.
Technical Association of the Pulp and Paper Industry, Atlanta, Ga.

Conference held in San Francisco, Calif., May 14-16, 1973. Preprinted Proceedings, TAPPI, Atlanta, Ga., 263 p.

Descriptors: *Conferences, *Pulp and paper industry, *Pollution abatement, *Environmental control, Environmental effects, Pulp wastes, Bleaching wastes, Sludge treatment, Sludge disposal, *Industrial wastes, *Waste water treatment, Recycling, Water reuse.

This volume of conference preprints contains the unreferred texts of 23 presentations by different authors. They deal largely with the treatment of pulp and paper mill effluents, the recovery of spent pulping liquors, water reuse and conservation, sludge handling and disposal, and related topics of ecological importance to the paper industry. (See W74-02274 thru W74-02286) (Brown-IPC)
W74-02273

THE CPAR PROGRAM - GOVERNMENT-INDUSTRY COOPERATION IN POLLUTION ABATEMENT RESEARCH,
Department of the Environment, Ottawa (Ontario).
J. E. Stone, and R. J. Neale.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings, TAPPI, Atlanta, Ga., p 5-8.

Descriptors: *Canada, *Research and development, *Governments, *Pollution abatement, *Pulp and paper industry, Grants, Contracts, Financing, *Waste water treatment, Water quality control, Air pollution, Industrial wastes, Pollutant identification, Toxicity, Analytical techniques, Aquatic life, Sulfite liquors, Color, Biochemical oxygen demand, Bioassay, Measurement, Coordination, Management.

The Cooperative Pollution Abatement Program (CPAR) of the Canadian government is designed to fund research projects between mid-1970 and March 1976 aimed at the development of better and cheaper methods of controlling water and air pollution in the pulp and paper industry. The joint government-industry nature of the program, its operation, and some typical projects thus far supported are outlined. In the water pollution abatement sector, the coordinating committee recognizes 7 general areas of research needs: (1) reduction of toxicity of effluents to aquatic flora and fauna, (2) reduction of effluent BOD, (3) recovery of spent sulfite liquors, (4) removal of suspended solids, (5) determination of cause-and-effect relationships between pollutants and the environment, (6) reduction of effluent color, and (7) development of measurement methods, notably rapid estimation of 5-day BOD and toxicity prediction from other than bioassay techniques. (See also W74-02273) (Brown-IPC)
W74-02274

WATER QUALITY CONTROL PROGRAM AT PUBLISHERS PAPER CO.,
Publishers Paper Co., Oregon City, Oreg.
C. Mayer, Z. Rozyski, and A. L. Caron.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings, TAPPI, Atlanta, Ga., p 9-14, 6 tab, 4 ref.

Descriptors: *Pulp wastes, *Treatment facilities, *Waste water treatment, *Pollution abatement, *Oregon, Pulp and paper industry, Sulfite liquors, Magnesium hydroxide, Magnesium compounds, Incineration, Filtration, Sludge treatment, Sludge disposal, Suspended solids, Aerated lagoons, Aeration, Biochemical oxygen demand, Operating costs, Capital costs, Costs, Economic efficiency, Filters, Waste treatment, Industrial wastes.
Identifiers: Willamette River (Ore), Sulfite mills, Groundwood mills, Newsprint mills, Clarifiers, White water, Integrated pulp and paper mills.

Publishers Paper Co. operates two integrated pulp and paper mills in Oregon City and Newberg, Oregon, which produce refiner groundwood, Mg-base sulfite pulp, newsprint, and tissue papers. Over a five-year period, the company invested $19.5 million in chemical recovery and effluent treatment installations, partly for pollution protection of the Williamette River. Aside from the initial conversion of the sulfite pulping and spent liquor recovery system to a soluble-base cooking liquor, these facilities included white water clarifiers, sludge-dewatering filters, and smokeless incinera-

tors to accomplish ca. 90% removal of suspended solids, as well as aerated stabilization basins to achieve BOD reductions of ca. 98%. Operating costs are calculated at ca. $11 per ton of solids removed and $0.02 per pound of BOD removed. (Brown-IPC)
W74-02275

MEASURING STRESS IN FISH EXPOSED TO PULP MILL EFFLUENTS,
British Colombia Research Council, Vancouver.
For primary bibliographic entry see Field 05C.
W74-02276

LABORATORY AND CONTROLLED EXPERIMENTAL STREAM STUDIES OF THE EFFECTS OF KRAFT EFFLUENTS ON GROWTH AND PRODUCTION OF SALMONID FISH,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W74-02277

PULP AND PAPER MILL SLUDGE UTILIZATION AND DISPOSAL,
Crown Zellerbach Corp., Camas, Wash. Environmental Services Div.
T. R. Aspitarte, A. S. Rosenfeld, B. C. Smale, and H. R. Amberg.
In: TAPPI Environmental Conference, San Francisco, Calif., May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 27-49, 18 tab, 4 fig.

Descriptors: *Sludge disposal, *Sludge treatment, *Pulp wastes, *Economic, Costs, Incineration, Byproducts, Fertilizers, Mulching, Soil amendments, Agronomic crops, Crop production, Dewatering, Drying, Marketing, Water reuse, Recycling, Waste water treatment.
Identifiers: Materials handling, Baling.

Four methods for reuse of fibrous sludge from primary effluent-treatment plants of pulp and paper mills are described and evaluated. They include (1) incineration in an entrained- air dryer-furnace, (2) combustion in hogged-fuel boilers, (3) agricultural soil conditioning, and (4) hydromulching for soil stabilization. Sludge properties varied considerably, but could be characterized with frequent sampling by determinations of Canadian Standard Freeness, ash content, and fiber size distribution. The variability of composition limits the use of sludge for by-products. Sludge sales are also restricted to bulk material of 30-40% consistency, requiring adequate handling facilities at loading-unloading sites. Baling after semidrying incurs further cost. The air-entrained incinerator involved high maintenance costs, owing to high temperature, high gas velocity, and high solids flow, but did meet air quality standards with proper operation. Sludge disposal by incineration cost ca. $13/dry ton, compared to $11.50 for combustion in hog-fuel boilers. In test farm plots, high sludge levels left to decompose for 1 year before crop planting resulted in significantly increased yields for two successive bean and corn harvests. However, addition of equivalent amounts of fresh sludge to yearly amended plots gave reduced crop yields, owing to nitrogen deficiency. Beans matured faster in plots amended with 400 and 600 tons of sludge per acre than in control plots. On a simulated highway cut, hydromulched sludge with or without bark dust proved to be competitive with a commercial product in establishing a grass stand. (See also W74-02273) (Brown-IPC)
W74-02278

ADVANCED PRACTICAL WATER RECYCLE IN TISSUE MANUFACTURE,
Kimberly-Clark Corp., Neenah, Wis.
A. R. LeCompte.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 50-65, 4 fig, 1 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Water reuse, Pulp and paper industry, *Industrial wastes, Effluents, Pollution abatement, *Recycling, Filtration, Sedimentation, Aeration, Calcium compounds, Magnesium compounds, Carbon dioxide, Lime, Calcium carbonate, Magnesium carbonates, Carbonates, Bicarbonates, Polyelectrolytes, Biochemical oxygen demand, Chemical oxygen demand, Suspended solids, Water quality control, *Canada, Industrial water.
Identifiers: Tissue papers, Paper machines, White water, Big East River, Canada, Ontario (Canada).

Built in a resort area, the Huntsville (Ontario) tissue mill of Kimberly-Clark of Canada Ltd. controls pollution of the Big East River by a water reclamation system which recycles about 87% of the process water to a high-speed tissue paper machine at rates of up to 2.5 million gal/day, while reducing the effluent to ca. 0.19 million gal/day. The multistage water and effluent treatment involves essentially retention in a polishing basin, aeration, and filtration through twin one-acre percolation beds. Chemicals used for removal of color, suspended solids, and corrosive components include Mg and Ca bicarbonates, carbon dioxide, unslaked reactive Ca oxide, precipitated Ca carbonate, and two unspecified polyelectrolytes. The treated effluent contains no color bodies, only 2.5 lb/day of nonfilterable residue, 1.8 to 6.0 lb of 5-day BOD loading, and 36 lb/day of COD. Its discharge increases the river's solids content from 45 to 480 mg/liter, but the effects of this on other stream qualities are said to be undetectable by conventional test methods. (See also W74-02273) (Brown-IPC)
W74-02279

ADVANCED TREATMENT OF PURIFIED SEWAGE FOR PRODUCTION OF HIGH--BRIGHTNESS PULP AND PAPER,
South African Pulp and Paper Industries Ltd., Springs. Enstra Mill.
H. J. Jacobs, and L. Smith.
In: TAPPA Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 51-58, 5 tab, 7 ref.

Descriptors: *Water reuse, *Sewage treatment, *Industrial water, Water supply, *Pulp and paper industry, Africa, Biological treatment, *Tertiary treatment, Flotation, Water purification, Freshwater, Water resources development, Coagulation, Corrosion, *Waste water treatment.
Identifiers: *South Africa, Aluminum sulfate, Polyfloc 84 D, Corrosion inhibitors, Vaal River (South Africa).

The Enstra mill of SAPPI has a daily production of ca. 190 tons bleached kraft pulp, 135 tons semibleached kraft pulp, 140 tons fine paper, and 200 tons newsprint. Of the mill's daily water supply, only 4.2 million U.S. gal is freshwater, pumped from the Vaal River 60 miles away. The greater proportion (6.6 million gal) derives from biologically purified and tertiary-treated sewage refined by a flotation process, using alum in conjunction with a polyelectrolyte (Davco Polyfloc 84A) to reduce alum dosage, plus NaOH to reduce water corrosivity. The development of this water treatment process is sketched from laboratory through pilot-plant studies to full-scale operation. The papermaking suitability of the sewage-derived process water is evaluated by means of a specially developed handsheet brightness test. (See also W74-02273) (Brown-IPC)
W74-02280

TREATMENT OF SULFITE EVAPORATOR CONDENSATES FOR RECOVERY OF VOLATILE COMPONENTS,
Institute of Paper Chemistry, Appleton, Wis.
I. W. Baierl, B. F. Lueck, and A. J. Wiley.
In: TAPPI Environmental Conference, San Francisco, Calif., May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 73-87, 1 tab, 11 fig.

Descriptors: *Pulp wastes, *Water reuse, Water purification, *Waste water treatment, *Activated carbon, *Byproducts, Pulp and paper industry, Biochemical oxygen demand, Chemical oxygen demand, Alcohols, Organic compounds, Sulfur compounds, Sulfite liquors, Water pollution treatment, Water pollution sources, *Recycling.
Identifiers: Methanol, Ethanol, Furfural, Sulfur dioxide, Sulfite pulp mills, Evaporator condensates, Condensates.

Cooperative research studies on the removal of pollutants from sulfite pulp mill evaporator condensates have been conducted for five years in two separate projects supported by the Environmental Protection Agency, the Wisconsin Dept. of Natural Resources, and ten pulp and paper companies. They are based partly on preliminary work done at Scott Paper Co. and the Lowell Technological Institute. A pilot plant for the Scott system, installed at the Appleton Division (Wisconsin) of Consolidated Papers Inc., involves steam stripping, adsorption on activated carbon, and fractional distillation. Operating experience showed that relatively pure sulfur dioxide, methanol, furfural, and acetic acid can be recovered, with excellent simultaneous reduction of condensate COD and BOD and with production of water sufficiently pure to be reused in the mill. The second system, based on a low-temperature (20 C) thermally regenerated activated carbon adsorption column, is being operated in the IPC laboratories, using a Lowell-designed unit in which the carbon can be reused through 31 or more cycles. Some process operating data and experiences for both systems are reported. (See also W74-02273) (Brown-IPC)
W74-02281

PROCESS WATER REUSE AND UPSET CONTROL MODIFICATIONS AT AN INTEGRATED NSSC MILL,
Green Bay Packaging Inc., Wis.
W. R. Nelson, G. O. Walraven, and D. C. Morris.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 219-227, 2 tab, 9 fig.

Descriptors: *Waste water treatment, *Pulp wastes, *Pollution abatement, *Treatment facilities, *Water reuse, Pulp and paper industry, Industrial water, Water purification, Effluents, Incineration, Evaporation, Water pollution treatment, *Wisconsin, Monitoring, Dissolved solids, Biochemical oxygen demand, Costs, Cost-benefit analysis, Reverse osmosis, Sewers, Rivers.
Identifiers: Corrugating medium, NSSC pulping, Fox River (Wis).

At Green Bay, Wis., Green Bay Packaging Inc. operates an integrated sodium-base NSSC (neutral sulfite semichemical) pulp and paperboard mill on the Fox River, manufacturing 295 tons/day of corrugating medium on a high-speed fourdrinier machine. Process water for the mill is taken from the river, but not pretreated, except for steam boiler makeup softening. The daily production of 200 tons of NSSC pulp from hardwoods gives rise to 200,000 lb/day of dissolved solids, of which 75% are removed in the combined screw pressate and digester blow liquors. collected wastes are evaporated indirectly to 21% solids content and passed to the concentrated spent liquor system before incineration in a fluid-bed Dorr-Oliver reactor. A pollution-control system encompassing extensive white water reuse has been installed, in which reverse osmosis plays a significant part. The arrangement of sewers, recycled water flows, spill surge flow, and internal monitoring system is described and flowcharted. Technical data are given on discharged effluent characteristics (BOD, conductivity, soluble and suspended solids) and on costs and benefits of the installation. (See also W74-02273) (Brown-IPC)
W74-02283

COLOR REMOVAL FROM KRAFT PULP MILL EFFLUENTS BY MASSIVE LIME TREATMENT,
International Paper Co., Mobile Ala.
R. S. Wright.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 229-235, 1 tab, 3 fig.

Descriptors: *Treatment facilities, *Pulp wastes, *Bleaching wastes, *Color, *Lime, *Waste water treatment, Effluents, Costs, Sludge, Foaming, Chlorine, Efficiencies, Operating costs, Pulp and paper industry.
Identifiers: Kraft mills, Lime kilns, Wash waters, Kraft pulp, Alkaline extraction, Chemical recovery, Materials balance (or Mass balance), White liquor.

Massive treatment with lime according to the process developed by NCASI (National Council of the Pulp and Paper Industry for Air and Stream Improvement, Inc.) will remove over 90% of the color bodies from effluents of the final unbleached kraft pulp washing and of the alkaline extraction stage in bleach plants. These two effluents contain 65-75% of the total color load produced in the manufacture of bleached kraft pulp. Using all the lime normally available in a typical bleached kraft mill, about 14% of the total effluent can be treated. By treating the most highly colored effluents, 72% of the mill's total color load can be removed. The introduction of massive lime into the mill's liquor causticizing operation will dilute the white liquor and lower its concentration by about 15%. Hence the total liquor volume to be handled throughout a mill will increase and require chemical recovery and liquor preparation equipment of greater capacity. For a given pulp production, the fuel requirements of lime will increase by about 6.4%. Moreover, the carryover of organic compounds by the massive lime sludge into the cooking liquor system can intensify foam problems. Buildups of Cl and other materials have no apparent effect on the chemical recovery cycle. A typical 1000 ton/day kraft mill may spend ca. $1.80 per ton of bleached pulp for massive lime treatment of 4 million gal effluent without adverse effect on pulp bleachability or final product quality. (See also W74-02273) (Brown-IPC)
W74-02284

HYPERFILTRATION (REVERSE OSMOSIS) OF KRAFT PULP MILL AND BLEACH PLANT WASTES,
Oak Ridge National Lab., Tenn.
J. S. Johnson, Jr., R. E. Minturn, and G. E. Moore.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 237-243, 1 tab, 24 ref.

Descriptors: *Reverse osmosis, *Membranes, *Pulp wastes, *Bleaching wastes, Pressure, *Waste water treatment, Industrial wastes, Pulp and paper industry, Filtration, Temperature, Operation and maintenance, Membrane processes, Polymers.
Identifiers: Hyperfiltration, Cellulose acetate, Zirconium oxide, Wash waters, Salt rejection, Polyacrylates (or Acrylic resins), Process variables.

Various kraft mill effluents, including brown stock wash water, decker and screen room wastes, and bleach plant effluents, were subjected to high-pressure hyperfiltration through dynamic membranes of polyacrylate on a hydrous Zr (IV) oxide substrate; to moderate-pressure ultrafiltration using low-salt-rejection membranes comprising single layers of hydrous Zr (IV) oxide or of neutral organic polymers; and to low-pressure filtration. Dewatering of dilute black liquor was also attempted. Compared to conventional detachable cellulose acetate membranes, fluxes were considerably higher, and decontamination seemed adequate for reuse of many filtrates. Moreover, filtration could be conducted at the process temperature, and the membranes could be regenerated or removed and reformed in situ. (See also W74-02273) (Brown-IPC)
W74-02285

IMPROVING REVERSE OSMOSIS PERFORMANCE WITH DYNAMICALLY FORMED WOOD CHEMICAL MEMBRANES,
Institute of Paper Chemistry, Appleton, Wis.
I. K. Bansal, and A. J. Wiley.
In: TAPPI Environmental Conference, San Francisco, Calif., May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 245-256, 7 tab, 4 fig, 5 ref.

Descriptors: *Reverse osmosis, *Membranes, *Lignins, Water purification, *Desalination processes, Membrane processes, Desalination, *Pulp wastes, Byproducts, *Waste water treatment, Operation and Maintenance.
Identifiers: Salt rejection, Lignosulfonates, Wash waters, Process variables, Cellulose acetate, Zirconium oxide.

A systematic study is reported of factors affecting the design and performance of dynamically formed reverse osmosis (R.O.) membranes comprising high-molecular-weight lignin layers (obtained from dilute pulping effluents) as secondary active surfaces on cellulose acetate substrates. These membranes have salt rejection properties significantly better than those of conventional cellulose acetate membranes, at only a small sacrifice in flux rate. They are readily removable by washing and rapidly renewable within ca. 1 hr. Commercial R.O. modules, in which the acetate membranes had suffered hydrolytic and other degradation during 1-4 years of intermittent operation, could be successfully reactivated by superposition of dynamic lignin membranes. Among four different ligniferous preparations, crude fractions of chemimechanical pulp wash water were found to give membranes of superior salt rejection (NaCl, ammonium and calcium lignosulfonates) althogh dynamic membranes from ultrafiltered high-molecular lignin fractions were generally better in other respects. Important parameters affecting the membranes include their formation speed and pressure, the pH of the ligniferous solution, and the reverse osmosis feed velocity. Comparative performance data are presented for lignin-based vs. polyelectrolytic membranes made of hydrous Zr (IV) oxide. Although dynamic membranes are short-lived (3-4 days), they are rather inexpensive to prepare. (See also W74-02273) (Brown-IPC)
W74-02286

COMPUTER SIMULATION OF STORM WATER RUNOFF,
Northwestern Univ., Evanston, Ill. Technological Inst.
For primary bibliographic entry see Field 02E.
W74-02310

THE EFFECTS ON RUNOFF, GROUNDWATER, AND LAND OF IRRIGATING WITH CATTLE MANURE SLURRIES,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. I. Sewell, and J. C. Barker.
Available from the National Technical Information Service as PB-226 070, $3.50 in paper copy, $1.45 in microfiche. Research Report No. 31, Tennessee Water Resources Research Center, Knoxville, October 4, 1973. 26 p, 7 fig, 4 tab, 3 ref. OWRR A-021-TENN (3).

Descriptors: *Farm wastes, *Cattle, *Water reuse, Waste disposal, Slurries, *Waste management, *Organic wastes, Irrigation, Water quality, Groundwater, Surface runoff, Nitrates, Bacteria, Southeast U.S., *Tennessee, Humid climates, Path of pollutants.

The manure slurry irrigation system receiving lot runoff has performed satisfactorily and has been durable. Careful management is required to maintain storage capacity for lot runoff while controlling surface runoff or irrigated slurry. Dilution water must sometimes be added to the storage tank to facilitate solids removal. Dry-matter contents of slurry up to about 4 percent did not appreciably reduce system discharge rates. Manure slurry apparently infiltrated into the shallow groundwater on the downslope side of the test area. Surface runoff from the manure-saturated area on occasions contained both total and fecal coliform median concentrations exceeding the maximum standard for raw surface water for public supplies. All median surface runoff nitrate nitrogen concentrations were within the permissible criteria. An average application rate of 5.55 tons of dry matter per acre per month applied in the form of dairy manure slurry presented no problems of solids accumulation on the ground surface. Field irrigation with the manure slurry resulted in a 98% reduction in the total solids content of surface runoff and groundwater compared with that of the slurry.
W74-02326

FOURTH ANNUAL REPORT, CITY OF CARBONDALE, ILLINOIS, WATER AND WASTEWATER TREATMENT.
Carbondale Dept. of Public Works, Ill.

1971. 91 P, 21 FIG, 19 TAB.

Descriptors: *Documentation, *Water treatment, *Water works, *Sewage treatment, *Sewage disposal, Costs, Operation and maintenance, Water supply, *Waste water treatment, Illinois, Municipal wastes, Annual costs.
Identifiers: *Carbondale (Illinois).

The operation data for water and wastewater treatment plants in Carbondale, Illinois are presented. Included are data on the city's water treatment plant and its three wastewater treatment plants. Data included for the water treatment plant are: (1) personnel, (2) a flow chart of operation, (3) description of treatment processes, (4) history of plant expansion and facilities, (5) hydraulic flow data, (6) peak raw water flows, (7) chemicals used--by weight and cost, (8) laboratory data, and (9) flow and miscellaneous cost data. Information provided for the wastewater treatment plants include: (1) personnel, (2) a flow chart of operation, (3) hydraulic flow data, (4) raw influent data, (5) final effluent data, (6) plant efficiency data, (7) secondary plant data, (8) miscellaneous operating and cost data, (9) sludge disposal data, and (10) general cost data. The City obtains its water from both a nearby reservoir and a lake. Plant capacity is 8.0 mgd, and a total of 1.38 billion gallons of potable water was sold in 1971 at a operation and maintenance cost of 15 cents per 1000 gallons. Secondary sewage treatment is provided at a operation and maintenance cost of 24 cents per 1000 gallons and 1.1 billion gallons were treated in 1971. Effluent is discharged to a nearby creek. (Poertner)
W74-02328

SURVEY OF METHODS OF TREATING WINE AND GRAPE WASTE WATER,
New York State Dept. of Environmental Conservation, Albany. Environmental Quality Research and Development Unit.
T. J. Tofflemire.
Technical Paper No. 25, February 1973. 24 p, 8 tab, 38 ref.

Descriptors: *Waste water treatment, *Reviews, *Industrial wastes, *Fruit crops, Organic wastes, Waste treatment, New York, Biological treatment, Anaerobic digestion, Activated sludge, Trickling filters, Sewage lagoons.
Identifiers: *Winery wastes, *Grape waste water.

Waste characteristics and methods of treatment of wine and grape wastewaters were examined. These wastes have a high BOD, are seasonally variant and have a tendency to become acidic and odorous upon standing. Methods of possible treatment include: (1) activated sludge, (2) aerated lagoons, (3) trickling filters, (4) rotating biological disks, (5) irrigation systems, (6) anaerobic processes, and (7) chemical processes. Five principal winery wastes are described as: (1) pomace, which consists of dewatered grape skins, seeds and pulp, (2) lees, which are bottom sediment that accumulate during wine storage, (3) stillage bottle washings, the residue that remains after alcohol has been distilled from the fermented wine, lees or pomace, (4) cooling water wastes, and (5) salt waters from ion-exhange processes. Other wastes include various sugars, organic acids, proteins, trace metals, alcohol and other miscellaneous substances. A major difficulty in the use of biological methods of treatment is the high ratio of BOD to both nitrogen and phosphorus. Pretreatment is a usual practice to remove solids by cycloning, screening, sedimentation, or filtration. Treatment with other wastes by conventional methods is possible if close operational control is practiced. Lagoons and irrigation are more commonly used, and these methods can be simple, dependable and offer high quality treatment. Rotating disks are a new method which appears to be efficient and easy to operate. (Poertner)
W74-02329

CITY OF AUSTIN, TEXAS, STUDY OF WASTEWATER COLLECTION SYSTEM: PHASE I.
Horner and Shifrin, Inc., St. Louis, Mo.

Prepared for City of Austin, Texas, October 1, 1969. 139 p, 13 fig, 13 tab.

Descriptors: *City planning, *Sewerage, *Comprehensive planning, *Urbanization, *Sewers, Future planning (Projected), Cost-benefit analysis, *Texas, Economics, Combined sewers, Sewers, Separated sewers, Water pollution control, Long-term planning, Urban planning.
Identifiers: *Austin (Texas).

Expected future growth of the City of Austin, Texas requires that a plan be developed to provide adequate sewers. Two major alternatives were studied in this first phase of an overall study. One plan involves the construction of a parallel system of relief sewers, while the other plan relies on a deep tunnel transversing the city with supplemental sewers. The second plan was recommended because it was estimated to be the most economical alternative. It was estimated that the equivalent annual cost of the deep tunnel plan would be about $300,000 cheaper than the first plan in 1985, $427,000 cheaper in 1990, and $477,000 cheaper in 1995. The crosstown tunnel would also be less of an inconvenience to property owners and traffic, although the feasibility of the deep tunnel must be checked by soil tests. In developing the two plans, the planned future development of the City was taken into account. Based on the master plan for land use and expected populations along with water consumption rates for the various types of use, the size and placement of sewers was computed. An important factor in the plan was the extent of future growth. It was predicted that by 2020 the city would reach its ultimate development and that the system would need to be adequate for the expected state of development at that time. No further increase in system capacity was considered necessary after the year 2020. (Poertner)
W74-02330

METROPOLITAN WATER AND SEWER PLAN, LUBBOCK METROPOLITAN COUNCIL OF GOVERNMENTS.
Hudgins, Thompson, Ball and Associates, Inc., Lubbock, Tex.
For primary bibliographic entry see Field 03D.
W74-02331

A WATER AND SEWER PLAN: GREENE COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.

Prepared for Northeast Georgia Area Planning and Development Commission, Athens, December 1968. 151 p, 23 fig, 16 tab, 3 append.

Descriptors: *Comprehensive planning, *Water supply, *Sewerage, *Regional development, Sewers, Water supply development, Data collections, Financing, *Georgia, Optimum development plans, Financial feasibility, Forecasting, *Rural area.
Identifiers: *Green County (Geo).

A water and sewer plan for Greene County was prepared as part of a comprehensive water and sewer plan for the Northeast Georgia Area Planning and Development Commission. Financed by a grant of the Farmers Home Administration of the USDA, this report is concerned with rural areas and communities with a population of less than 5,500. Four communities of more than 300 and less than 5,500 exist in this county which had a total 1966 population of 11,300. Predictions for 1990 population range from a high of 16,140 to a low of 3,505. With the higher figure favored. Green County is located about 75 miles east of Atlanta. It has about 48 inches of rainfall annually. Temperatures range from an average of 46F in winter to 80F in summer with an annual average of 63 degrees. Two major rivers and several smaller rivers and creeks exist in the County. Public water supply systems serve only three communities, with water derived from both surface and ground water sources. Due to the low population densities in the County, it is recommended that a county-wide system not be developed but, instead, that individual communities develop systems if desired. County ownership of all water systems may be practical to reduce operating costs and provide easier financing and expansion. Sewerage systems exist in only two communities. In one other community it might be economically feasible to establish a system. (Poertner)
W74-02334

A WATER AND SEWER PLAN: MORGAN COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.

Prepared for Northeast Georgia Area Planning and Development Commission, Athens, April 1969. 115 p, 16 fig, 13 tab, 3 append.

Descriptors: *Comprehensive planning, *Water supply, *Sewerage, *Regional development, Sewers, Water supply development, Data collections, Financing, *Georgia, Optimum development plans, Financial feasibility, Forecasting, *Rural areas.
Identifiers: *Morgan County (Geo).

A water and sewer plan for Morgan County was developed as part of a comprehensive water and sewer plan for the Northeast Georgia Area Planning and Development Commission. Financed by the Farmers Home Administration of the USDA, this study is concerned with communities less than 5,500 in population and rural areas. With a total county population of about 10,000 in 1960 (down from 20,000 in 1920), only two communities of population less than 5,500 and greater than 300 exist in the county. Total county population in 1990 is predicted at about 3,000, with the City of Madison having about 4,000 and the City of Rutledge, the next largest city, about 280. Located about 60 miles east of Atlanta, the area receives about 47 inches of rainfall annually and has a temperature range from an average of 46F in winter to about 80F in summer. Surface water supply includes several rivers and streams and is abundant. Domestic water is primarily from wells. The major water system serves the City of Madison, where 500,000 gpd are pumped from a creek. System capacity is not adequate and major improvements have been suggested to provide more water to existing users and to extend water service. Three other communities also have public water supplies which should be adequate until about 1985 or 1990. No recommendations for providing water supply to rural areas were made. Sewerage systems exist in two communities; one is adequate until 1990 and the other is presently inadequate. Upgrading of the latter is suggested and outlined. In other areas of the County, sewerage systems should not be needed until 1990. (Poertner)
W74-02335

A WATER AND SEWER PLAN: MADISON COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.

Prepared for Northeast Georgia Area Planning and Development Commission, Athens, February 1969. 146 p, 23 fig, 14 tab, 3 append.

Descriptors: *Comprehensive planning, *Water supply, *Sewerage, *Regional development, Sewers, Water supply development, Data collections, Financing, *Georgia, Optimum development plans, Financial feasibility, Forecasting, *Rural areas.
Identifiers: *Madison County (Geo).

A water and sewer plan for Madison County was prepared as part of a comprehensive water and sewer plan for the Northeast Georgia Area Planning and Development Commission region. Financed by the Farmers Home Administration of the USDA, the primary purpose was to develop recommendations for water sewer service to rural areas and incorporated communities having a population of less than 5,500. Madison County is located about 70 miles northeast of Atlanta. It covers about 180,000 acres and receives about 48 inches of rainfall a year. The average temperature is about 62F, varying from 44F in winter to 79F in summer. The 1966 County population was about 12,000 which is expected to increase to about 14,000 by 1990. Other population estimates indicate a possible decline to about 4,300 persons by 1990. Only very limited public water supply systems exist in seven communities having a combined 1960 population of 2,400. Most domestic water is from wells, and although some of these wells have gone dry in periods of extreme drought, no evidence of ground water shortage exists. A County water system is recommended. It would obtain water from the City of Athens in neighboring Clarke County. There are presently no sewerage systems in Madison County. Sewerage systems are recommended for four of the larger communities in a 5-year improvement program. No other sewerage systems are proposed before 1985. (Poertner)
W74-02336

A WATER AND SEWER PLAN: WALTON COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.

Prepared for Northeast Georgia Area Planning and Development Commission, Athens, May 1968. 139 p, 15 fig, 13 tab, 3 appendices.

Descriptors: *Comprehensive planning, *Water supply, *Sewerage, *Regional development, Sewers, Water supply development, Data collections, Financing, *Georgia, Optimum development plans, Financial feasibility, Forecasting, *Rural areas.
Identifiers: *Walton County (Geo).

A water and sewer plan for Walton County was developed as a part of a comprehensive water and sewer plan for the Northeast Georgia Area

Planning and Development Commission. With financial assistance of the Farmers Home Administration of the USDA, the study centered on communities with a population of 5,500 or less and on rural areas. From a total population of 21,700 in 1966, the County is expected to grow to about 28,245 by 1990. The County is located about 40 miles east of Atlanta and has an average rainfall of 48 inches per year. Temperatures range from an average of 45F in winter to 80F in summer. Water resources appear to be adequate with two major rivers and numerous minor streams present in the area. Most water for domestic use on farms is obtained from wells. Three cities have a population in excess of 300, with one over 5,500. Five public water supply systems exist in the County. It is recommended that a county-wide water supply system be developed along major throughfares with the primary water supply furnished by the City of Monroe, the largest city in the County which is located at the approximate center. This would provide water to areas presently not served by public supplies. It could also augment existing systems. Sewerage systems, where they exist, are inadequate. Recommended improvements are not scheduled until 1985, for financial reasons. Only the two largest communities under the 5,500 population limit have public sewerage systems. (Poertner)
W74-02337

REGIONAL WASTEWATER FACILITIES STUDY.
Anderson-Nichols and Co., Inc., Concord, N.H.

Prepared for Upper Valley Planning and Development Council, Lebanon, New Hampshire, July 1972. 185 p, 32 fig, 24 tab, 42 ref, 15 appendices.

Descriptors: *Comprehensive planning, *Planning, *Waste water treatment, Waste water disposal, *Regional analysis, Regional development, *New Hampshire, *Vermont, Economies, Sewage treatment, Sewage disposal, Costs, *Treatment facilities.

The projected growth of the Upper Valley Planning and Development Council region in Vermont and New Hampshire makes it important that planned development be used for efficient growth. Seven urban areas are identified, with an estimated 1975 population of 37,530, which is expected to grow to 98,380 by 2020. Existing flow rates of waste water are about 4.1 mgd; by 2020 the flow rate is expected to be about 10.7 mgd. Six alternative methods for providing waste water collection and treatment were considered. These included both regional and individual systems. Current methods include collection systems in 3 cities, with treatment plants serving one city and a section of another. Municipal collection and treatment will be needed in 5 communities. Two phases for construction are outlined. An intra-state approach is recommended with all discharges to the Connecticut River. It is estimated that New Hampshire will be able to qualify for 95 percent grants, while Vermont programs will be able to receive grants of 90 percent. Total annual cost is estimated at $342,336 for the 5 communities. (Poertner)
W74-02338

NORTHEAST GEORGIA AREA WATER AND SEWER SYSTEMS PLAN AND CAPITAL IMPROVEMENT PROGRAM.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 03D.
W74-02339

WATER QUALITY CHARACTERISTICS OF STORM SEWER DISCHARGES AND COMBINED SEWER OVERFLOWS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 05B.
W74-02345

CHLORINATION EFFECTS ON ORGANIC CONSTITUENTS IN EFFLUENTS FROM DOMESTIC SANITARY SEWAGE TREATMENT PLANTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05C.
W74-02416

STABILITY AND REMOVAL OF COMMERCIAL DYES FROM PROCESS WASTEWATER,
Clemson Univ., S.C.
For primary bibliographic entry see Field 05B.
W74-02429

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA STEEL INDUSTRY,
Auburn Univ., Ala. Water Resources Research Inst.
G. R. Rowe, Jr., and H. B. Pickle.
Available from the National Technical Information Service as PB-226 260 $4.75 in paper copy, $1.45 in microfiche. Bulletin 12, 1973. 150 p, 17 fig, 32 tab, 46 ref, 2 append. OWRR C-3292 (no 3715) (2).

Descriptors: *Economic impact, *Industrial wastes, *Pollution abatement, Prices, Value, Marketing, *Alabama, Waste water treatment, *Treatment facilities, *Cost analysis.
Identifiers: *Steel industry.

The steel industry is faced with the need for rebuilding and modernization in addition to pollution abatement. All of these factors are important in determining the total economc impact of water pollution abatement in the steel industry and are examined. The economic impact of water pollution abatement in the steel industry was measured by deriving data to determine the following: (1) The cost to steel firms of installing effluent treatment facilities. (2) The per unit cost increase due to pollution abatement firms will pass on to industrial users. (3) Shifts in purchasing by steel users due to the resulting increased price. (4) The per unit price increase due to pollution abatement industrial users will pass on to ultimate consumers. The present standards for water pollution control will not cause sufficient harm, by themselves, to severely affect the industry as a whole. The economic analysis of the industry has shown, however, that the combination of expenditures for water pollution abatement, air pollution abatement, installation of new technology and capacity, servicing of debt load, and paying for rising production factor costs will combine to create a considerable strain on the financial resources of iron and steel producers in years to come.
W74-02437

WATER-TREATMENT-SLUDGE FILTRATION STUDIES,
Auburn Univ., Ala. Dept. of Civil Engineering.
J. F. Judkins, Jr.
Available from the National Technical Information Service as PB-226 224 $3.00 in paper copy, $1.45 in microfiche. Alabama Water Resources Research Institute , Auburn Bulletin 15, 1973. 36 p, 12 fig, 5 tab, 22 ref. OWRR A-024-ALA (5).

Descriptors: Water treatment, Sludge, *Filtration, *Waste water treatment, *Sludge treatment.
Identifiers: *Alum sludge, *Lime-Softening Sludge, Crystal Seeding.

Research was conducted to examine the filtration characteristics of alum and lime-softening sludges and to determine if the crystal seeding process could be used to improve the filterability of the sludges. Although calcium hardness had no significant affect on the filterability of lime-softening sludge, magnesium hardness concentration was found to have a definite affect on the filterability of the sludge. Sludges high in magnesium content were more difficult to filter than sludges low in magnesium. Crystal seeding was found to be effective in improving the filterability of both alum sludge and lime-softening sludge. The size of crystal seed dosage, the mixing rate and the number of sludge recycles appear to be important factors in the crystal seeding process.
W74-02440

IMPACT OF SEWAGE TREATMENT MODIFICATIONS ON WATER QUALITY OF A RESERVOIR,
Tennessee Univ., Knoxville. Dept. of Civil Engineering.
J. D. Womack, J. C. Burdick, III, and F. C. Larson.
Water Resources Bulletin, Vol 9, No 1, p 100-115, February 1973. 6 fig, 17 ref.

Descriptors: *Water quality, *Sewage treatment, *Waste water treatment, Economics, *Public health, *Tennessee, Reservoir, Activated sludge, Treatment facilities, Costs.
Identifiers: *Fort Loudoun Reservoir (Tenn).

As a result of several investigations, dating from 1966 to the present, a rather comprehensive surveillance of water quality conditions has been maintained in Fort Loudoun Reservoir on the Tennessee River near Knoxville, Tennessee. During the period covered by these investigations, the Knoxville Third Creek Sewage Treatment Plant was upgraded from a primary plant to a secondary (activated sludge) treatment plant. Comparison of the collected data is being undertaken to elucidate the impact of these modifications upon water quality conditions in the reservoir.Consideration is given to the improvements of water quality as related to the expenditure for modification of the treatment facilities. In addition, comment is directed toward the public health significance of the water quality conditions determined.
W74-02483

METHOD FOR REMOVING SUSPENDED SOLIDS FROM LIQUIDS,
Ecodyne Corp., Chicago, Ill. (assignee).
B. L. Goodman, and J. W. McKibben.
U. S. Patent No. 3,764,525, 6 p, 9 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 638, October 9, 1973.

Descriptors: *Patents, *Waste water treatment, *Suspended solids, Industrial wastes, Municipal wastes, *Filtration, Screens, Water pollution control, Water quality control.

An improved method is provided for removing suspended solids from liquids by using a screen having a coating of the solids. Waste liquid is delivered to the screen with a directional component across the screen surface and a directional component through the screen. The screen has openings that are large enough to pass a majority of the suspended solids, and the screen has the ability to hold a layer of the solids on the upstream side. The flow of the liquid is controlled so that the coating is formed and maintained on the screen, and serves as a filtration medium. There is also a liquid filtration zone having a screen separating it into influent and effluent zones. (Sinha-OEIS)
W74-02484

NITRIFICATION OF BOD-CONTAINING WATER,
Union Carbide Corp., New York. (Assignee).
M. J. Stankewich, Jr.
U. S. Patent No. 3,764,523, 9 p, 6 fig, 3 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 638, October 9, 1973.

Descriptors: *Patents, Oxygen, Carbon, Nitrogen, *Aeration, *Nitrification, *Waste water treatment, *Biological treatment, Microorganisms, Pollution abatement, Water pollution control, Water quality control, *Biochemical oxygen demand.

A method is presented for treating BOD-containing water by aeration in contact with activated sludge, settling sludge from the aeration and recycling sludge to the aeration zone as the activated sludge wherein the carbon food in the water is bio-chemically oxidized with at least 50 percent oxygen by volume feed gas. A feed stream comprising at least in part the carbon-depleted effluent water is passed to a nitrification zone. Oxygen-depleted aeration gas of at least 20 percent oxygen content is released from the nitrification zone, and nitrifying sludge from the zone is settled and wasted at a rate such that sludge retention time in the nitrification zone is 3-20 days, with part being recycled as the nitrifying sludge recycle. (Sinha-OEIS)
W74-02485

METHOD AND APPARATUS FOR ELECTROLYTIC TREATMENT OF SEWAGE,
Pacific Engineering and Production Co. of Nevada, Henderson. (assignee).
B. B. Halker.
U. S. Patent No. 3,764,500, 7 p, 15 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 632, October 9, 1973.

Descriptors: *Patents, *Sewage treatment, *Electrolysis, *Disinfection, Odors, Color, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, Chemical oxygen demand, Biochemical oxygen demand.

The method and apparatus comprises the judicious application, at certain strategic locations in a sewage treatment plant, of electrolytic treatment of a portion or all of the stream. The apparatus includes one or more electrolytic assemblies employing anodes formed of a coating of lead dioxide on a substrate of graphite or titanium, and preferably includes a hollow, cylindrical metal tube which forms the cathode and with the anode contained therein and in the form of a cylindrical member whose outer surface is equidistantly spaced from the inner surface of the cathode container. Electrolyte flows through the assembly from an inlet conduit near the bottom to an outlet conduit near the top, and electrical connections are made to the exterior cathode can and to a portion of the anobe substrate which protrudes from the top of the assembly. The electrolytic treatment of all or a portion of the stream takes place to supplement the customary sewage treatment method. (Sinha-OEIS)
W74-02486

PROCESS FOR REMOVAL OF CONTAMINANTS FROM WASTES,
K. Okubo, and A. Ueno.
U. S. Patent No. 3,764,499, 5 p, 10 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 632, October 9, 1973.

Descriptors: *Patents, *Waste water treatment, *Metals, Copper, Zinc, Silver, Chromium, Cadmium, Pollution abatement, Water pollution control, Water quality control, Electrodes, *Electrolysis.

An electrolytic process is discussed for the removal of such contaminants as cyanides, and metals such as copper, zinc, silver, chromium, and cadmium. An electrolytic cell is partitioned by a membrane into at least two electrolytic chambers which are filled with electric conductors and positive and negative major electrodes forming an anode chamber and a cathode chamber in abutting relation through the membrane. The rinse water is selectively led into the anode or cathode chamber to effect the reduction and/or oxidation with decomposition of the toxic metals and cyanides so that the pollution concentration of the rinse water is lowered. The rinse water with less pollution is then moved through the membrane into the cathode or the anode chamber to bring a further reduction and/or oxidation with decomposition of the residual metals and cyanides. (Sinha-OEIS)
W74-02487

SEWAGE TREATMENT APPARATUS,
D. E. Owens.
U. S. Patent No. 3,764,011, 3 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 519, October 9, 1973.

Descriptors: *Patents, *Sewage treatment, Pollution abatement, *Aeration, *Chlorination, Water pollution control, *Waste water treatment.
Identifiers: Portable equipment, Gravity flow.

A portable self-contained sewage treatment plant particularly designed to meet the needs of small sub-divisions contains within a single tank body an aeration chamber, a settlement chamber and a chlorination chamber. The plant features an aeration system which also serves to power jets for the return of heavy and light solids from the settlement chamber into the aeration chamber. A floating skimmer in the settlement chamber removes light solids from the surface of the liquid for delivery to one return jet. Liquid from the settlement chamber flows into the chlorination chamber and clear effluent is discharged from the latter. (Sinha-OEIS)
W74-02489

CANYON PUBLIC SERVICE DISTRICT V. TASA COAL COMPANY (EMINENT DOMAIN PROCEEDING HELD PUBLIC SERVICE DISTRICT HAD RIGHT TO CONDEMN DEFENDANT'S LANDS FOR USE IN CONNECTION WITH SEWER FACILITIES, DEFENDANT APPEALS).
For primary bibliographic entry see Field 06E.
W74-02531

REGIONAL WATER, SEWAGE, AND SOLID WASTE DISTRICTS.

Ind. Ann. Stat. secs 27-2801 thru 27-2844 (1970).

Descriptors: *Legislation, *Sewage systems, *Indiana, *Solid wastes, Ultimate disposal, Water quality, Water pollution sources, Disposal, Legal aspects, Water quality control, Water resources development, Water districts.

Indiana Annotated Statutes deal with regional water, sewage, and solid waste districts. The statutes provide that any area situated in any unincorporated part of one or more contiguous counties or in one or more municipal corporations, or both, may be organized as a regional water, sewage and solid waste district in the manner and subject to the conditions provided in the act in order to provide a water supply for domestic, industrial and public use to users within and without the district. Moreover, they may be established to provide for the collection and disposal of storm and sanitary sewage and other liquid waste within and without the district and to provide for the collection and disposal of solids waste and refuse within and without the district. Following the purposes and various definitions, the statutes provide for hearings, petitioning procedures, organization of the districts, the applicability of eminent domain, revenue bonds, special assessments, referendums, and various other procedures to provide water supply systems and sewerage systems. (Mockler-Florida)
W74-02535

WATER RECYCLING OF SEWAGE EFFLUENT BY IRRIGATION: A FIELD STUDY ON OAHU,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 02B.
W74-02631

ELECTROCHEMICAL FLOTATION CONCEPT FOR REMOVING OIL FROM WATER,
Lockheed Aircraft Service Co., Ontario, Calif.
Q. H. McKenna, H. H. Helber, L. M. Carrell, and R. F. Tobias.
Available from NTIS as AD-760 056. Final Report No. 734305.2/4, prepared for Coast Guard Office of Research and Development, January 1973. 131 p, 20 fig, 31 tab, 7 ref. DOT-CG-24288-A.

Descriptors: Pollution sources, *Waste water treatment, *Oily water, Bubbles, *Separation techniques, Costs, *Pollution abatement, *Water quality control.
Identifiers: Electrochemical flotation, Bilge water, Flotation, Water pollution prevention.

A study was undertaken to determine the feasibility of an electrochemical flotation system for separating oil from bilge water. This system involves flotation, using electrolytically-produced micro-gas bubbles, subsequent to coagulation and/or adsorption of oily impurities in the water. Initial electroflotation tests were conducted in batch modules to determine the chemical treatment necessary to achieve the desired separation of the entire spectrum of oil-brackish water combinations. Addition of NaOH to adjust the pH to approximately 10 along with 10-15 ppm of anionic polyelectrolyte was the only pretreatment necessary for all oily waters tested. Processing of real bilge waters as well as simulated bilge and ballast waters in the continuous flow modules produced optically clear effluent waters with less than 10 ppm residual oil. Emulsified oil concentrations in the influent stream were as high as 3000-4000 ppm. The operating temperature of the system is restricted to temperatures below 110F. Ship motions of 10 deg pitch and 15 deg roll up to a frequency of 6 cycles per minute did not interfere with the normal operation of the system. Pilot plant data were used to estimate the costs of systems with capacities of 30, 100, and 1000 gpm. The total capital costs are $31,320, $80,500 and $600,000, respectively, while the total operating cost per 1000 gallons is $0.77. (Sinha-OEIS)
W74-02634

INVESTIGATION OF SORBENTS FOR REMOVING OIL SPILLS FROM WATERS,
Naval Ship Research and Development Center, Annapolis, Md.
For primary bibliographic entry see Field 05G.
W74-02636

5E. Ultimate Disposal of Wastes

DETERMINATION OF THE MECHANICAL COMPATIBILITY OF POROUS ROCKS WITH WASTE WATER IN ITS SUBSURFACE DISPOSAL,
Ustredni Ustav Geologicky, Brno (Czechoslavakia).
For primary bibliographic entry see Field 05B.
W74-02165

PULP AND PAPER MILL SLUDGE UTILIZATION AND DISPOSAL,
Crown Zellerbach Corp., Camas, Wash. Environmental Services Div.
For primary bibliographic entry see Field 05D.
W74-02278

BACTERIAL PROTEIN FROM PAPER MILL SLUDGES,
Forest Service (USDA), Madison, Wis. Forest Products Lab.
J. M. Harkin, and D. L. Crawford.
In: TAPPI Environmental Conference, San Francisco, May 14-16, 1973. Preprinted Proceedings TAPPI, Atlanta, Ga., p 145-151, 4 tab, 25 ref.

Descriptors: *Sludge treatment, *Byproducts, *Pulp wastes, *Proteins, *Fermentation, *Actinomycetes, Bacteria, Cellulose, Thermophilic bacteria, Foods, Pulp and paper industry, Enzymes, Food processing industry, Microorganisms, *Waste water treatment, Industrial wastes.
Identifiers: Thermonospora fusca.

Thermonospora fusca is a strongly cellulolytic thermophilic filamentous actinomycete which grows well on various pulps and pulp mill fines (fine fibers) of low lignin contents. Fermentation of such materials with this bacterium at 55 C achieves a considerable reduction in their volume while producing a readily harvestable high-value protein. Thermophilic fermentations of paper mill effluent sludges might be used in waste disposal systems or for production of animal or poultry feed protein. Extracellular enzymes in the spent fermentation broth are byproducts that could find new uses in the food and beverage industries or in the paper industry itself for stock preparation. (See also W74-02273) (Brown-IPC)
W74-02282

IMPROVING REVERSE OSMOSIS PERFORMANCE WITH DYNAMICALLY FORMED WOOD CHEMICAL MEMBRANES,
Institute of Paper Chemistry, Appleton, Wis.
For primary bibliographic entry see Field 05D.
W74-02286

HYDROGEOLOGIC ASPECTS OF A PROPOSED SANITARY LANDFILL NEAR OLD TAMPA BAY, FLORIDA,
Geological Survey, Tallahassee, Fla.
R. N. Cherry, and D. P. Brown.
Open-file report 73015, 1973. 25 p, 8 fig, 3 tab, 9 ref.

Descriptors: Baseline studies, *Landfills, *Hydrogeology, *Groundwater movement, *Florida, Aquifers, Aquifer characteristics, Waste disposal, Garbage dumps, Planning, Sanitary engineering, Environmental control, Water pollution control, Environmental sanitation, Data collections, Evaluation.
Identifiers: *Clearwater (Fla).

The proposed sanitary landfill site for the city of Clearwater is in east-central Pinellas County near Old Tampa Bay. The area of the site is about 320 acres. The site is about 50 feet above mean sea level and is partly drained by two unnamed streams. One stream is a tributary of the Lake Tarpon outfall canal; the other stream, a tributary of Bishop Creek, drains into the north end of Old Tampa Bay. The two aquifers in the area are: a shallow aquifer, which is composed of sand containing a limestone zone, and the Floridan aquifer, which is composed of limestone. At the site of the proposed landfill, the two aquifers are separated by an average of 35 feet of clay that forms a confining layer of low vertical permeability. The head difference between the shallow and Floridan aquifers is 40 feet, and the rate of vertical movement within the proposed landfill site from the shallow aquifer through the clay layer to the underlying Floridan aquifer is estimated to be 32,000 gpm in an area of 320 acres. The site could be made hydrologically favorable for a sanitary landfill if some precautions are taken. A perimeter canal could intercept water leaving the site. Also, maintaining a monitoring system would allow early detection of possible movement of contaminated water. (Woodard-USGS)
W74-02628

5F. Water Treatment and Quality Alteration

SOME REGULARITIES OF SR90 ACCUMULATION IN THE BODY OF A RAT WITH A HIGH FLUORINE CONTENT IN ITS DRINKING WATER, (IN RUSSIAN),
For primary bibliographic entry see Field 05C.
W74-02195

SIXTEEN YEARS OF WATER FLUORIDATION IN THE NETHERLANDS AND ITS INFLUENCE ON DENTAL DECAY,
Utrecht Rijksuniversiteit (Netherlands). Microbiology Lab.
G. W. Kwant.
Fluoride, Vol 6, No 1, p 49-56, 1973, Illus.
Identifiers: *Dental decay, *Fluoridation, *Netherlands, Historical studies, Water treatment, Public health.

For the Dutch fluoridation project, the towns of Culemborg and Tiel were selected after sociological screening. Tiel was fluoridated up to 1.1 mg/l in March 1953, and compared to Culemborg with a fluoride concentration of 0.1 ppm in its drinking water. In this experiment, caries were diagnosed in different sites. This method permitted a better insight into the total number of cavities in a dentition. It also showed that fluoridation did not have the same effect on all tooth surfaces. Caries of the proximal surfaces was diagnosed with the aid of X-rays, whereas all other sites were evaluated clinically. The main study groups, consisting of children 11-15 yr-old, were examined every second year. Each age class in these groups consisted of about 70 boys and 70 girls. All these children were born and had resided either in Tiel or in Culemborg all their lives. During the course of these 16 yrs, the caries frequency in Culemborg increased whereas it decreased in Tiel. (See also W74-02230)--Copyright 1973, Biological Abstracts, Inc.
W74-02229

COMMENTS ON THE PAPER BY G. W. KWANT 'SIXTEEN YEARS OF WATER FLUORIDATION IN THE NETHERLANDS AND ITS INFLUENCE ON DENTAL DECAY,'
Institute of Environmental Research, Graz (Austria).
R. Ziegelbecker, and H. M. Thomson.
Fluoride, Vol 6, No 1, p 57-63, 1973, Illus.
Identifiers: Child, Decay, Dental, Fluoridation, G, Kwant, Netherlands, Paper, W, Water, Years.

The article by G. W. Kwant which purports to prove fluoridation a success in the Netherlands exhibits serious shortcomings. They pertain to the following: selection of an adequate control city; proper sampling of the children; lack of essential data; and faulty interpretation of the results. Factors other than fluoride were given no consideration nor were the long-term effects on older children and adults evaluated; these are requisites for conclusions regarding the total dental effects. (See also W74-02229)--Copyright 1973, Biological Abstracts, Inc.
W74-02230

REMOVAL OF ORGANIC MATERIAL BY ADSORPTION ON ACTIVATED CARBON,
Chemviron S.A., Brussels (Belgium).
For primary bibliographic entry see Field 05D.
W74-02264

THE REMOVAL OF ORGANIC COMPOUNDS IN THE PRODUCTION OF POTABLE WATER,
Water Research Association, Marlow (England).
R. B. Gauntlett, and R. F. Packham.
Chemistry and Industry, No 17, p 812-817, September 1, 1973. 1 tab, 5 fig, 19 ref.

Descriptors: *Water treatment, *Potable water, Odor, Taste, Color, *Coagulation, *Adsorption, *Oxidation, *Filtration, *Chlorination, Ozone, Chlorine, Activated carbon, Humic acids, Fulvic acids, Phenols, Oil, Hydrocarbons, Chlorine compounds, Manganese, Iron, Water treatment, Surface waters.
Identifiers: Chlorine dioxide, Potassium permanganate, Precipitation (Chemical), Oxidants, Manganese dioxide, Manganese compounds.

Surface water constituents contributing to objectionable taste, odor, and color include mainly humic and fulvic acids leached from peaty and other soils. Pollutants having low odor thresholds include diesel oil and chlorinated phenols. Water purification methods for public consumption involve mainly chemical precipitation, using aluminum sulfate or similar coagulants; adsorption, usually on activated carbon; and/or oxidation by means of chlorine, chlorine dioxide, ozone, or potassium permanganate. More than one of these processess may be needed to remove all objectionable material. Principles for selection of the best sequence must consider possible antagonism between treatment methods, as well as the multifunctionality of any one process. Thus, activated carbon beds should be used after filtration, but before chlorination, since they gain efficiency by prolonged contact, but are cloggingprone and also effective dechlorinizers. The effluent from adsorption columns, which provide sites for bacterial growth, should be disinfected. Permanganate must be added before coagulants, so that any manganese dioxide formed is coprecipitated. Ozonization should usually be the final step for economic reasons and to avoid oxidative degradation of adsorbed organics into less easily removable products. Other oxidants are also best applied last, except for removal of Fe or Mn. Local circumstances may dictate deviations from these rules. (Brown-IPC)
W74-02265

CONCENTRATION OF ENTEROVIRUSES FROM LARGE VOLUMES OF WATER,
Baylor Coll. of Medicine, Houston, Tex. Dept. of Virology and Epidemiology.
M. D. Sobsey, C. Wallis, M. Henderson, and J. L. Melnick.
Applied Microbiology, Vol 26, No 4, p 529-534, October 1973. 4 tab, 1 fig, 11 ref.

Descriptors: *Public health, *Potable water, *Viruses, *Water analysis, *Water treatment, *Aquatic microorganisms, Filtration, Adsorption, Monitoring, Membrane processes, Filters, Freshwater.
Identifiers: Poliomyelitis, Cellulose nitrate, Fiberglass, Epoxy resins.

Upon acidification of large volumes of clean water, viruses can be efficiently absorbed to epoxy-fiberglass and cellulose nitrate filters in the absence of exogenously added salts. Based on this finding, a modified virus-concentrating system for the monitoring of clean waters was developed. The water to be tested is acidified by injection of 1N HCl and passed through a fiberglass cartridge depth filter and an epoxy-fiberglass membrane filter in series. The adsorbed viruses are then eluted with 1 liter of eluent at pH 11.5 and reconcentrated by adosorption on and elution from a series of small epoxy-fiberglass filters. Using this method, small quantities of polio virus in 100-gal volumes (378.5 liter) of tapwater were concentrated nearly 40,000-fold with an average virus recovery efficiency of 77%. (Brown-IPC)
W74-02271

FOURTH ANNUAL REPORT, CITY OF CARBONDALE, ILLINOIS, WATER AND WASTEWATER TREATMENT.
Carbondale Dept. of Public Works, Ill.
For primary bibliographic entry see Field 05D.
W74-02328

WATER-TREATMENT-SLUDGE FILTRATION STUDIES,
Auburn Univ., Ala. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-02440

PUBLIC WATER SUPPLIES--CHLORINATION.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.
For primary bibliographic entry see Field 05G.
W74-02538

PUBLIC WATER SUPPLIES.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.
For primary bibliographic entry see Field 05G.
W74-02539

5G. Water Quality Control

MINIMIZING NITRATE SEEPAGE FROM THE HULA VALLEY INTO LAKE KINNERET (SEA OF GALILEE): 1. ENHANCEMENT OF NITRATE REDUCTION BY SPRINKLING AND FLOODING,
Technion-Israel Inst. of Tech., Haifa. Soils and Fertilizers Lab.
For primary bibliographic entry see Field 05B.
W74-02153

PLANT NUTRIENT CONCENTRATIONS IN RUNOFF FROM FERTILIZED CULTIVATED EROSION PLOTS AND PRAIRIE IN EASTERN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Soils.
For primary bibliographic entry see Field 05B.
W74-02154

THE EFFECTS OF ACID MINE WATER ON GROWTH (NUMBER AND SIZE) OF CHLORELIA VULGARIS,
West Virginia Univ., Morgantown. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-02168

THE GROWTH OF CHLORELLA VULGARIS IN SEWAGE AND ACID MINE WATER,
West Virginia Univ., Morgantown. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-02169

URBAN STORM DRAINAGE ACTIVITIES IN NEW YORK,
Soil Conservation Service, Albany, N.Y.
For primary bibliographic entry see Field 04A.
W74-02171

IN SITU TREATMENT METHODS FOR HAZARDOUS MATERIAL SPILLS,
Calspan Corp, Buffalo, N.Y.
For primary bibliographic entry see Field 05D.
W74-02179

ORGANIC FILMS ON NATURAL WATERS: THEIR RETRIEVAL, IDENTIFICATION, AND MODES OF ELIMINATION,
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 05A.
W74-02182

APPLICABILITY OF THE INTERCEPTOR WATERWAY CONCEPT TO THE ROOKERY BAY SANCTUARY,
Tropical Bioindustries Development Co., South Miami, Fla.
For primary bibliographic entry see Field 04A.
W74-02205

OPTIMIZATION OF INDUSTRIAL SYSTEMS WITH THE SEPARABLE PROGRAMMING AND THE GENERALIZED REDUCED GRADIENT METHODS,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
J. L. Williams.
Available from the National Technical Information Service as PB-226 187, $15.75 in paper copy, $1.45 in microfiche. M.S. Thesis, 1972. 265 p, 44 fig, 5 tab, 48 ref. OWRR A-038-KAN (4). 14-31-0001-3216.

Descriptors: *Optimization, *Computer programs, Model studies, Water quality, *Industries, Mathematical studies.
Identifiers: *Water quality control systems, *Geometric programming, *Gradient methods, Nonlinear programming.

Two nonlinear programming methods and their application to industrial systems are reviewed. Separable programming is described and exemplified. The same procedure is presented that is used in the separable programming subroutine of the Mathematical Programming System/360 (MPS/360). A supplemental FORTRAN program for assisting the usage of MPS/360 when solving separable programming problems is presented. An interesting application of separable programming to solve the geometric programming dual problem with N-degrees of difficulty is also exhibited. The second technique considered is the generalized reduced gradient method. The mathematical theory is presented and numerical examples are used to exemplify it. Its application via the GREG program is evaluated, and numerous computer examples are worked. The study is concluded with the application of the technique to optimize a water quality control model.
W74-02213

COST EFFECTIVENESS OF CURRENT ENVIRONMENTAL ENGINEERING PRACTICES,
Camp, Dresser and McKee, Boston, Mass.
For primary bibliographic entry see Field 05D.
W74-02225

ATTEMPT AT MOLLUSK CONTROL BY INCREASING THE PLANKTONIC BIOMASS AND BY MOLLUSCICIDAL TREATMENT: THE UREA-N-TRITYLMORPHOLINE ASSOCIATION (IN FRENCH),
Institut Tropical Suisse, Basel.
For primary bibliographic entry see Field 05C.
W74-02226

ECONOMIC ASPECTS OF ENVIRONMENTAL PROTECTION (IN GERMAN),
D. Karsten.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Urig Reihe B Hyg Praev Med, Vol 155, No 3, p 330-339, 1971, English summary.
Identifiers: Economics, *Environmental protection, Sewage, *Cost analysis, *Pollution-costs (Public).

Industrial firms, public bodies and households frequently save expenditure e.g., for sewage purification, by dumping refuse into the environment. The community has to bear costs which arise through private activities. Pollutors should pay a sum equivalent to the estimated cost of the damage caused. The economic damage must be determined by means of utilization cost analysis.--Copyright 1973, Biological Abstracts, Inc.
W74-02227

THE PROSPECTS OF USING THE RYBINSK WATER STORAGE BASIN FOR FISHERIES, (IN RUSSIAN),
For primary bibliographic entry see Field 08I.
W74-02241

(TAPPI) ENVIRONMENTAL CONFERENCE, MAY 14-16, 1973.
Technical Association of the Pulp and Paper Industry, Atlanta, Ga.
For primary bibliographic entry see Field 05D.
W74-02273

THE CPAR PROGRAM - GOVERNMENT-INDUSTRY COOPERATION IN POLLUTION ABATEMENT RESEARCH,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 05D.
W74-02274

EFFECTS OF HIGHWAY BRIDGE CONSTRUCTION ON A SUBARCTIC STREAM,
For primary bibliographic entry see Field 04C.
W74-02295

WATER QUALITY MANAGEMENT IN GROUNDWATER BASINS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 05B.
W74-02356

STATE WATER PLAN, PROCEEDINGS OF 18TH ANNUAL NEW MEXICO WATER CONFERENCE.
For primary bibliographic entry see Field 06B.
W74-02456

IMPACT OF SEWAGE TREATMENT MODIFICATIONS ON WATER QUALITY OF A RESERVOIR,
Tennessee Univ., Knoxville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-02483

APPARATUS FOR CONFINING FLOATING POLLUTANTS,
E. H. Rolfson.
U. S. Patent No. 3,764,015, 3 p, 8 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 520, October 9, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, Water quality control, *Pollution abatement, Equipment, *Separation techniques.

A sizeable number of substantially rectangular buoyant lightweight and fire-proof platforms are provided which are connected in series and adapted to be towed to the site while flat, made to surround the area from which the pollutants are to be removed, and then rotated approximately 180 degrees on their axes to assume a substantially vertical position. While in vertical position these substantially rectangular platforms are adjustable as to the depth to which they extend. After the pollutants have been removed to a satisfactory extent, the platforms are rotated on their longitudinal axes to assume their initial flat position, and then towed away while still serially connected as before. Means for effecting the rotational movement of each of the substantially rectangular platforms is provided by one or more elongated tanks which extend transversely of the platforms, and which are divided by an airtight partition into an airtight flotation compartment and an airtight ballast compartment, together with means for adjusting the quantity of water in each of the ballast tanks; also

for adjusting the depth to which the platforms extend into the water when in their vertical positions. (Sinha-OEIS)
W74-02488

OIL SKIMMING APPARATUS,
Cities Service Oil Co., Tulsa, Okla. (Assignee).
J. W. Penton.
U.S. Patent No. 3,762,556, 4 p, 2 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 161, October 2, 1973.

Descriptors: *Patents, *Skimming, *Oil spills, *Oil pollution, Separation techniques, Equipment, Water pollution control, Water quality control, *Pollution abatement.

An oil skimming apparatus is comprised of a floating housing placed within a body of water, for example a settling pond, which has an oil slick. The housing includes multiple, interconnected hinged gates to provide weirs over which the oil slick can spill into an oil sump within the housing. Oil which accumulates within the housing is pumped out of the sump into a storage vessel. The interconnected hinged gates are counterbalanced to hold them in a normally upright position, but as oil is pumped from the housing the interconnected gates fall inwardly into the housing at a slight angle so that oil spills over the gates into the sump while also prevent excessive inflow of water. The housing has multiple compartments defined by the gates. Water is removed from the compartments through piping which communicates with the lower region of each compartment. (Sinha-OEIS)
W74-02491

UNDERWATER TANKER BALLAST WATER/OIL SEPARATION,
Chicago Bridge and Iron Co., Oak Brook, Ill. (Assignee).
J. S. McCabe.
U.S. Patent No 3,762,548, 3 p, 3 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 158, October 2, 1973.

Descriptors: *Patents, *Oil pollution, *Separation techniques, Gravity, *Pollution abatement, Water quality control, Water pollution control.
Identifiers: Ballast.

Ballast water contaminated with entrained or emulsified oil is transferred to an underwater disengagement zone operating on the water displacement principle, as exemplified by an underwater storage tank having an upward convex shell with an opening in its bottom through which water can move into and out of the shell. In the disengagement zone, the ballast is separated under the influence of gravity, into separate oil and water phases. The oil rises to a point which it can be recovered. The separated water flows out of the open bottom of the zone into the body of water. (Sinha-OEIS)
W74-02492

FLOATING WATER JET FOR OIL SLICK CONTROL,
Department of the Navy, Washington, D.C.
D. J. Graham.
U. S. Patent No. 3,762,169, 3 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 61, October 2, 1973.

Descriptors: *Patents, Separation techniques, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Water quality control.

An oil containment boom comprises a flexible rubber hose having attached floats placed at spaced intervals. Water jets are connected to the hose between the floats and counterweights are added to balance the unit. A water pump provides low pressure water to a hose which is sprayed through the jets against the oil slick, forcing it to the recovery mechanism. (Sinha, OEIS)
W74-02494

WATER POLLUTION CONTROL,
R. L. Pardee.
U. S. Patent No. 3,762,168, 3 p, 3 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 61, October 2, 1973.

Descriptors: *Patents, Barriers, *Skimming, *Flotsam, *Oil pollution, *Oil spills, *Pollution abatement, Water quality control, Water pollution control, Equipment.

The skimmer consists of a barrier which can be placed at an acute angle to the flow of water to divert an upper portion of the water striking it. The debris (pollutants) are directed to a collecting area. The barrier may also be used to protect an offshore working area, such as an oil well rig. The barrier is mounted so that it will automatically rise and fall with the changing level of the waterway. The barrier is formed with vertical loops or sleeves at its opposite ends to receive upright posts rigidly supported. Suitable bearings may be interposed between the posts and loops to permit free vertical movement of the barrier. (Sinha-OEIS)
W74-02495

DEVELOPMENT OF THE FREEDOM OF SCIENTIFIC RESEARCH ISSUE OF THE THIRD LAW OF THE SEA CONFERENCE,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 06E.
W74-02501

CHALLENGES TO FEDERALISM: STATE LEGISLATION CONCERNING MARINE OIL POLLUTION,
Oregon Univ., Eugene. School of Law.
P. N. Swan.
Ecology Law Quarterly, Vol 2, No 3, p 437-470, Summer 1972. 219 ref.

Descriptors: *Oil pollution, *Water pollution, *Florida, *Legislation, Judicial decisions, Legal aspects, Oil industry, Law enforcement, Oil wastes, Water pollution sources, Disasters, Chemical wastes, Water quality.

The recent case decision holding a state statute invalid due to the inability of the states to legislate within admiralty jurisdiction is criticized, arguing that this principle is not constitutionally mandated. Other challenges to the statute--that it violates the commerce clause, or is prempted by the Federal Water Quality Improvement Act--are also discussed. The preventive provisions of the statute should be upheld by the Supreme Court when it hears the case on appeal. The state statute was designed to serve five basic purposes: to confer licensing authority; to regulate the deliverance and transference of hazardous materials, including oil and petroleum products; to establish a compensation and control expense fund; to make terminal operations and carriers strictly liable for pollution damage; and to make them responsible for removing escaped pollutants. Until the federal government takes greater initiative in the areas of pollution prevention and clean up, state remedies such as those under the statute in question should be held valid. (Mockler-Florida)
W74-02502

LEGAL DEVELOPMENTS IN CANADIAN WATER MANAGEMENT,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 06E.
W74-02505

GROUNDWATER POLLUTION IN THE WESTERN STATES--PRIVATE REMEDIES AND FEDERAL AND STATE LEGISLATION,
S. J. Nixon.
Land and Water Law Review, Vol 8, p 537-564, 1973. 193 ref.

Descriptors: *Water pollution, *Groundwater, *Remedies, Water Quality Act, Federal Water Pollution Control Act, Pollution abatement, Legal aspects, Legislation, Water quality control.
Identifiers: Water Pollution Control Act Amendments of 1972.

Remedies against groundwater pollution on the private, state, and federal levels have been clearly established by precedent as well as recent legislation. Private remedies have been stressed by both federal and state legislation. State groundwater quality standards, which should be established, may simplify the burden of proof for the private litigant and the state enforcement authority. Regulative legislation as well as preventative and compensatory private action are discussed. Private remedies including private nuisance, public nuisance, negligence, other general remedies and defenses are discribed. Also considered are state legislation and federal legislation, including legislative history. (Sears-Florida)
W74-02506

PROPER TIME LIMITATIONS ON OUTER CONTINENTAL SHELF LEASES UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT,
For primary bibliographic entry see Field 06E.
W74-02509

GUIDELINES FOR THE COASTAL ZONE.
Coastal Plains Center for Marine Development Services, Wilmington, N.C.
For primary bibliographic entry see Field 02L.
W74-02510

MICHIGAN STATE WATER POLLUTION CONTROL PLAN.
Michigan Water Resources Commission, Lansing.

June 1973. 125 p, 9 tab, 4 chart.

Descriptors: *Water quality control, *Water quality act, *Michigan, Water control, Water resource development, Water quality standards, Pollution standards, Water permits, Legal aspects, Administration, Governments, Comprehensive planning, Water management (Applied), Water policy.

Michigan's official water pollution control plan for fiscal year 1974 is presented. This document represents the third step in the planning process developed in response to the federal water quality act. The first step consisted of a continuing planning process followed by a second document on the state's water strategy for fiscal year 1974. This third document includes plans for monitoring, issuing permits for pollution discharge, enforcement, training and administration of the state's water resources and supply. An output summary and resource need chart for the state are included. (Daniels-Florida)
W74-02511

RIVER BASIN MONETARY AUTHORIZATIONS--DISASTER RELIEF ACT AMENDMENTS.
For primary bibliographic entry see Field 06E.
W74-02516

ENVIRONMENTAL PROTECTION ACT OF 1973, FIRST SESSION ON S.1104.
For primary bibliographic entry see Field 06E.
W74-02518

STATE OF NEW JERSEY, DEPARTMENT OF ENVIRONMENTAL PROTECTION V. JERSEY CENTRAL POWER AND LIGHT COMPANY (ACTION TO ENFORCE PENALTY PROVISION FOR DISCHARGE OF HARMFUL SUBSTANCE INTO TIDAL WATERS).
For primary bibliographic entry see Field 06E.
W74-02520

BARTA V. BRINEGAR (CIVIL ACTIONS BROUGHT AGAINST FEDERAL AND STATE OFFICIALS SEEKING TO ENJOIN CONSTRUCTION OF HIGHWAY SEGMENT UNTIL COMPLETION OF ENVIRONMENTAL IMPACT STUDY).
For primary bibliographic entry see Field 06E.
W74-02521

U.S. V. AMERICAN CYANAMID COMPANY (ACTION FOR DISCHARGE INTO NAVIGABLE WATERWAYS).
For primary bibliographic entry see Field 06E.
W74-02522

ENVIRONMENTAL DEFENSE FUND, INC. V. FROEHLKE (ACTION BROUGHT FOR DECLARATORY JUDGMENT AND INJUNCTION RESTRAINING COMPLETION OF RESERVOIR PROJECT).
For primary bibliographic entry see Field 06E.
W74-02524

STATE OF MAINE V. M/V TAMANO (SUIT TO RECOVER DAMAGES INCURRED AS RESULT OF DISCHARGE INTO WATERS OF BAY).
For primary bibliographic entry see Field 06E.
W74-02525

UNITED STATES V. LINDSAY (GOVERNMENT'S ACTION AGAINST CITY FOR ALLEGED VIOLATION OF REFUSE ACT AND NEW YORK HARBOR ACT, AND FOR CREATION OF PUBLIC NUISANCE).
For primary bibliographic entry see Field 06E.
W74-02526

A BILL TO PRESCRIBE PROCEDURES SO AS TO MAKE ADMINISTRATION OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 MORE EFFECTIVE.
For primary bibliographic entry see Field 06E.
W74-02528

REGIONAL WATER, SEWAGE, AND SOLID WASTE DISTRICTS.
For primary bibliographic entry see Field 05D.
W74-02535

PUBLIC WATER SUPPLIES--CHLORINATION.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.

Technical Release No. 10-2, September 14, 1972. 5 p, 6 fig.

Descriptors: *Illinois, *Public health, *Water supply, *Water treatment, *Water quality control, *Chlorination, Chemicals, Engineering, Pollution abatement, Surface waters, Groundwater, Limestone, Sanitary engineering.

Treatment by continuous and adequate chlorination is required by the State of Illinois in the following instances: when the supply is obtained from a surface source; when the supply is exposed to contamination during the course of treatment; when groundwater sources are or may become contaminated; or where local conditions, i.e. flooding indicates that a factor of safety is desirable to guarantee the quality of the supply. Chlorination is not considered as a substitute for a proved sanitation practice. Two major factors are considered with respect to chlorinator capacities. The first is basic requirements, meaning sufficient capacity available to satisfy immediate chlorine demand and give a true residual of at least triple that indicated by the accompanying set of curves for free or combined chlorination. Certain local conditions are to be considered such as pH, water temperature, contact time, presence of nitrogenous compounds, etc. The second factor is normal design requirements. Other areas covered are: chlorine feed equipment, spare chlorinator parts, location of equipment and parts, chlorine gas masks, weighing scales, and residual chlorine testing kit. (Napolitano-Florida)
W74-02538

PUBLIC WATER SUPPLIES.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.

Technical Release No. 10-1, September 14, 1972. 2 p.

Descriptors: *Illinois, *Protection, *Pollution abatement, Pollutant identification, Technical writing, Septic tanks, Cesspools, Sewers, Seepage, Ponds, Subsurface waters, Oil pollution, Floodwater, Wells, Reservoir sites, Filters.

The Illinois Environmental Protection Agency has promulgated specific minimum distances between certain sources of contamination and public water supply structures. The sources of contamination considered are: privies, septic tanks, cesspools; sewers (storm and sanitary); subsurface seepage-disposal lines; pits or ponds receiving surface waters, oil, grease, etc; and flood waters. Structures to be protected are: wells, clear-water reservoirs, gravity filters, section lines, iron-removal and chlorine reaction basins, and wet-salt-storage basins. A chart is included specifying the distance from each source of contamination. The minimum distances are given for clay and loam soils with the stipulation that when structures are to be located in more pervious soils, such as sand or gravel, the minimum distances are to be increased accordingly. Caution is urged regarding the location of structures in areas where creviced limestone may be disturbed. If structures requiring isolation from contamination are to be located in such areas, advice from the agency should be sought. (Napolitano-Florida)
W74-02539

SUBMERGED LANDS.
For primary bibliographic entry see Field 06E.
W74-02540

HYGIENIC CONDITIONS IN THE PROCUREMENT OF DRINKING WATER FROM INDIVIDUAL SOURCES (IN GERMAN),
For primary bibliographic entry see Field 05B.
W74-02547

ERTS-1 INVESTIGATION OF ECOLOGICAL EFFECTS OF STRIP MINING IN EASTERN OHIO,
Bendix Corp., Ann Arbor, Mich.
For primary bibliographic entry see Field 07B.
W74-02572

APPLICATION OF ERTS-1 DATA TO THE PROTECTION AND MANAGEMENT OF NEW JERSEY'S COASTAL ENVIRONMENT,
Earth Satellite Corp., Washington, D.C. Geosciences and Environmental Applications Div.
For primary bibliographic entry see Field 07B.
W74-02579

HYDROCARBON-OXIDIZING BACTERIA AND THEIR POSSIBLE USE AS CONTROLLING AGENTS OF OIL POLLUTION IN THE OCEAN,
Naval Weapons Center, China Lake, Calif. Research Dept.
G. Soli.
Available from NTIS, Springfield, Va. 22151 AD-746 163. Price $3.00 printed copy; $1.45 microfiche. Technical Report No 2, July 1972. 18 p, 2 fig, 4 tab, 4 ref. ONR Task No NR 137-887.

Descriptors: *Oil pollution, *Oily water, *Pollution abatement, *Biodegradation, *Organic compounds, Bacteria, Microorganisms, Chemical reactions, Biological communities, Biochemistry, Data collections, Oil spills, Marine bacteria, Water pollution control, Methodology, Evaluation.

Degradation of petroleum hydrocarbons by marine bacteria is a subject of increasing interest due to the fact that these microorganisms are responsible for the dissimilation of oil which enters natural waters as a contaminant. Attempts were made at characterizing various bacterial strains, isolated from marine environments, on the basis of their ability to attack groups of hydrocarbons, rather than through a conventional bacteriological key. Because hydrocarbons are not always completely oxidized to CO2 and water, but rather degraded to intermediate products such as the corresponding acids or alcohols, a study of the effect of degraded and undegraded crude oil on marine phytoplankton organisms was also initiated. All the bacterial strains investigated demonstrated the ability to digest normal paraffins, with the exception of one strain which attacks preferentially aromatic hydrocarbons. Some of the strains were able to oxidize all three isoparaffins in the mixture, as well as cycloparaffins and aromatics. The results are tabulated. (Woodard-USGS)
W74-02618

ELECTROCHEMICAL FLOTATION CONCEPT FOR REMOVING OIL FROM WATER,
Lockheed Aircraft Service Co., Ontario, Calif.
For primary bibliographic entry see Field 05D.
W74-02634

FEASIBILITY STUDY OF THE SAND SINKING METHOD OF COMBATTING A MAJOR OIL SPILL IN THE OCEAN ENVIRONMENT,
Office of the Chief of Engineers (Army), Washington, D.C.
L. Tobias, L. J. Mauriello, and G. M. Watts.
Available from NTIS as AD-742 949. Final Report prepared for Coast Guard Office of Research and Development, December 1971. 35 p, 13 fig, 1 append. MIPR-Z-70099-9-93403.

Descriptors: *Feasibility studies, *Oil spills, *Pollution sources, Chemical reactions, Oceans, *Water quality control, *Pollution abatement, Environmental effects, *Separation techniques.
Identifiers: *Sand sink method.

The objective was to determine the feasibility of the sand sink method developed by Shell Research in combatting a major oil spill in the ocean environment. The sand sink method sinks floating oil by spraying the oil slick with sand previously made oleophilic by a chemical treatment. The technique contemplates that the sand would be obtained from the sea bottom in the nearshore coastal areas by use of a trailing suction hopper dredge. The dredge with its cargo of sand would then proceed to the site of the oil spill where the sand would be converted to a slurry by the addition of sea water by the dredge pumps. After injection of the chemical into the flowline, the mixture of treated sand would be sprayed over the floating oil by means of a boom and nozzle system extending over the sides of the vessel. The oil wet properties of the treated sand grains would attract the oil in the slick and the oil coated sand grains would sink to the bottom. Laboratory tests were conducted to deter-

mine optimum chemicals and sand to oil ratios for maximum effectiveness for the types of sands existing along the coastal areas of the United States. Different types of oils were investigated as well as different sand gradations to develop the effectiveness parameters. Tables and graphs were developed for different oils, sand ratios and chemical treatment concentrations. Studies were made of the modifications necessary to adapt the Corps Hopper Dredge GOETHALS for a sand sink capability. The investigation suggests that the sand sink method is a feasible technique but its use would depend on consideration of the relative values of environmental factors. (Sinha-OEIS)
W74-02635

INVESTIGATION OF SORBENTS FOR REMOVING OIL SPILLS FROM WATERS,
Naval Ship Research and Development Center, Annapolis, Md.
P. Schatzberg.
Available from NTIS as AD-742 950. Final Report No. 724110.1/2/1, prepared for Coast Guard Office of Research and Development, November 1971. 48 p, 15 fig, 20 tab, 14 ref, 11 append. MIPR-Z-70099-0-00584.

Descriptors: *Oil spills, Separation techniques, *Pollution sources, *Pollution abatement, Water quality control.
Identifiers: Polymeric hydrocarbon, Polymeric foam, Water pollution prevention, *Sorbents, Petroleum products.

Laboratory methods have been developed to evaluate floating sorbent materials for removing oil spilled on water. These methods were applied to 49 different sorbent materials belonging to five categories: inorganic, natural organic, polymeric foam, polymeric hydrocarbon, and miscellaneous products. Some of the properties evaluated were oil and water sorption capacity, oil retention, buoyancy retention with and without absorbed oil, effect of petroleum product variation, sorbent/oil coherence, and reusability. Of all the materials evaluated the polymeric foam and the polymeric hydrocarbon products showed the best overall properties for removing oil spilled on water. Of these two groups, the resilient polyurethane foams and the polypropylene fibers were the best materials. The inorganic, the natural organic, and the miscellaneous products showed a relatively low capacity for oil and a relatively poor buoyancy retention. (Sinha-OEIS)
W74-02636

INSECT PEST MANAGEMENT IN COASTAL AND ESTUARINE HABITATS,
North Carolina State Univ., Raleigh. Dept. of Entomology.
R. C. Axtell, and K. L. Knight.
Available from NTIS as COM-72-10453. Sea Grant Publication, Progress Report, December 1971. 56 p, 3 fig, 3 tab. SG 2-35178 and ES00069.

Descriptors: *Insects, Coasts, Estuaries, Diseases, Mosquitoes, Environmental effects, *Aquatic insects, *Pollution abatement, *North Carolina, Insect control, *Marsh management, *Marsh plants, Aquatic habitats, Ecosystems.
Identifiers: Flies, Tabanidae, Juncus, Spartina, *Pest management.

Areas of Carteret Co., North Carolina are being used as a model to develop the data required for a pest management program in a coastal and estuarine situation. Initially it is necessary to determine: (1) What species of pests are present. (2) Which ones are of economic importance. (3) Where do they breed. and (4) What factors regulate their abundance. Research has been in progress (1970-71) on two phases; the populations and breeding habitats of biting flies (Tabanidae), and the effect of ditching Juncus marsh on the production of mosquitoes. (Sinha-OEIS)
W74-02643

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

MUNICIPAL WATER PLANNING--MIXED INTEGER APPROACH,
Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03D.
W74-02223

HYDROLOGIC AND WATERSHED MODELING FOR WATERSHED PLANNING,
Soil Conservation Service, Portland, Oreg.
For primary bibliographic entry see Field 04D.
W74-02224

HYDROLOGIC SIMULATION MODEL OF COLORADO SUBALPINE FOREST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 07B.
W74-02248

SYSTEMS ANALYSIS OF IRRIGATION WATER MANAGEMENT IN EASTERN IDAHO,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 04B.
W74-02322

USE OF SYSTEMS APPROACHES IN PLANNING ISRAEL'S WATER RESOURCES MANAGEMENT,
Tahal Consulting Engineers Ltd. (Tel Aviv, Israel).
M. Gablinger, J. Schwarz, and Y. Vardi.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 38 p, 6 tab, 2 fig.

Descriptors: *Water resources, *Regional analysis, *Model studies, Management, Water transfer, Water requirements, Regional development, Water allocation (Policy), Water resources development, Aquifers, Economic impact, Demand, Water demand, Computer models, Statistical models.
Identifiers: *Israel.

The historical, legal, and physical background to Israel's water problems is presented. The principal water resource supply characteristics are identified as large supplies of water in the country's main aquifers, and relatively high seasonal and variable rainfall. Demand, on the other hand, is characterized by a high agricultural use which cannot be significantly reduced in the foreseeable future, in spite of the steadily growing domestic and industrial requirements. A resource management policy is therefore desired to postpone recourse to costly large-scale sea water desalination, indicate ways of using part of the water accumulated in the aquifers while minimizing the danger of irreversible degradation of aquifers, and minimize curtailment in agricultural allocations. At present a series of interacting resources management models is being developed to devise appropriate operational and development patterns. Some of these models, using linear programming and statistical techniques, are outlined. A hierarchy of such models is established in which outputs of more general models serve as inputs for more detailed ones. Sensitivity analyses serve as indicators for information aquisition policies. (Muller-Arizona)
W74-02352

A BAYESIAN DECISION FRAMEWORK FOR SYNTHETIC HYDROLOGY,
IBM Watson Research Center, Yorktown Heights, N.Y.
J. R. Wallis, and P. E. O'Connell.
Available from the National Technical Information Service as PB-226 289 $3.00 in paper copy, $1.45 in microfiche. Completion Report, July 1973. 44 p, 29 ref. OWRR C-4094 (no 9019) (1).

Descriptors: Simulation analysis, Stochastic Processes, Optimization, *Risks, Statistical methods, Synthetic hydrology, *Longterm planning, Decision making.
Identifiers: Operational hydrology, *Monte Carlo methods, *Bayes Theorem, *Decision Theory.

Given that the large uncertainity in the amount of persistence that should be incorporated into synthetic hydrology it is believed that a Bayes risk decision theoretic approach would be the optimal strategy for water resource system designers. A methodology and example of use for this concept are given.
W74-02438

DEVELOPMENT OF MODELS FOR ANALYZING WATER RESOURCES DEVELOPMENT AND USE WITHIN A REGIONAL FRAMEWORK,
Iowa State Univ., Ames.
J. F. Timmons, and J. R. Prescott.
Available from the National Technical Information Service as PB-226 296, $5.25 in paper copy, $1.45 in microfiche. Completion report, ISWRRI-55, Iowa State Water Resources Research Institute, Iowa State University, Ames, Iowa, June 1973. 209 p, 3 fig, 5 tab, 115 ref. OWRR B-015-IA (6).

Descriptors: *Mathematical models, *Water resources development, *Regional analysis, *Economic impact, *Simulation analysis, *Linear programming, Optimization, Planning, Evaluation, Costs, Pricing, Research, Abstracts, Bibliographies, Systems analysis, *Water utilization.
Identifiers: Contiguous water basins.

Reported are the research accomplishments of a project with the following objectives: (1) construction of mathematical models emphasizing (a) integration of the water sector within regional models and (b) the combination of regional models in simulating the impacts of economic development on water uses; (2) incorporation of spatial and temporal dimensions within the above-mentioned models, and the evaluation of effects and costs of alternative institutional and pricing policies to seek a more equitable incidence of water uses; and (3) application of models emphasizing water used within and among contiguous water basins with particular reference to spatial aspects of regional water planning. The journal articles, book chapters, proceedings papers, and dissertations belonging to this research effort are listed. The completed articles, chapters and papers (numbering 6), and detailed summaries of the dissertations (numbering 5) are provided in this volume's appendix; preceding this is a brief section summarizing the models directly pertinent to the aforementioned objectives and the papers dealing with problems of regional modeling influencing the work conducted under the research grant. The modeling techniques considered are primarily simulation and linear programming optimization. (Bell-Cornell)
W74-02455

6B. Evaluation Process

A SUMMARY ANALYSIS OF NINETEEN TESTS OF PROPOSED EVALUATION PROCEDURES

ON SELECTED WATER AND LAND RESOURCE PROJECTS.
Water Resources Council, Washington, D.C.

Report to the Water Resources Council by the Special Task Force, July 1970. 201 p, 13 tab.

Descriptors: *Testing, *Methodology, Water resources development, *Multiple-purpose projects, Analytical techniques, *Evaluation, Research and development, Measurement, Projects, Testing procedures, *Standards, Performance, Variability, Planning, Economic efficiency, Economic justification, *Estimated benefits, *Estimated costs.

A series of tests was instituted by the Water Resources Council in 1969 on several types of water resources projects to determine whether in evaluating the measurement and effects in terms of benefits and costs, and in the formulation of alternative plans, different teams can accomplish appropriate results and achieve reasonably uniform comparability in application. The test results substantiated that the 1969 report was concerned primarily with concepts and included only a few standards and procedures to implement them. Much of that testing effort was directed toward the development of standards and procedures to implement the concepts. The tests indicate that the multiobjective approach to planning is practical. Meaningful results can be accomplished and reasonably uniform comparability in application can be achieved by establishing carefully structured principles, standards, and procedures. The report contains the test procedures used, an analysis of the test results, and an analysis of the methodology and procedure used in the tests. (Mockler-Florida)
W74-02188

AN ECOLOGICAL EVALUATION OF STREAM EUTROPHICATION,
Michigan State Univ., East Lansing. Inst. of Water Research.
For primary bibliographic entry see Field 05C.
W74-02201

USER RELATED STUDY OF THREE MICHIGAN RIVERS,
Michigan State Univ., East Lansing. Dept. of Park and Recreation Resources.
L. W. Moncrief.
Available from NTIS as PB-226 067 $3.75 in paper copy, $1.45 in microfiche. OWRR C-3381 (No 3723) (10). Supplement A of Project Completion Report, July 1973. 78 p.

Descriptors: *Recreation, Recreation demand, *Attitudes, *Michigan, Social aspects, *Water utilization.
Identifiers: *User related study.

Recreational use, user characteristics, and user perceptions were measured on three rivers in Michigan: the Red Cedar, the Au Sable and the Jordan Rivers. The data were gathered by means of a mailed questionnaire, using a population sample obtained on-site at the three rivers. The majority of users on all three rivers had not participated in any recreational activity at 'their' river more than one to four times during the calendar year preceding the time they answered the questionnaire. This study investigates the recreational behavior of the users of three distinct types of recreational rivers. This research should give some idea of the effect of location, latent and ongoing recreation activity opportunities, use conditions and general environmental conditions on behavior and perceptions. Reasons for using a river are complex and not well understood. It would appear that the nearness of the user to a stream may serve as a deterrent to its use for recreation. The questions on both questionnaires, user and non-user, are grouped in an effort to determine certain overall perceptions and attitudes of the respondents. In addition, there are questions to determine uses of the rivers, user perceptions of management and the socio-economic background of the respondents. (See also W74-02201)
W74-02202

ECONOMIC EVALUATION OF THE SPORT FISHERY OF THE AU SABLE RIVER, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Park and Recreation Resources.
J. W. Pearce, and L. W. Moncrief.
Available from NTIS as PB-226 111 $3.75 in paper copy, $1.45 in microfiche. OWRR C-3381 (43723) (11). Supplement B of a Project Completion Report, July 1973. 65 p.

Descriptors: Economics demand, Natural resources, Management, *Sport fishing, *Michigan, Economic impact, *Cost analysis, Recreation, Input-output analysis, Water utilization, Decision making.
Identifiers: *Au Sable River (Mich), Clawson's method, *Sport fishing.

The Au Sable River sportfishing resource was subjected to a three-phase economic demand analysis utilizing existing statewide fishery survey data collected during 1970 and 1971. Confidence in the applicable data extracted for this analysis is limited; hence, the results drawn from it should be viewed with caution. The best estimate of the economic value to the State of Michigan as a result of resident (state residents) sportfishing on the Au Sable was $536,640 in 1970. Since economic information was not requested of fishermen surveyed in 1971, expenditure data from the 1970 analysis were extrapolated to the angling pressure (angler days) reported during 1971. This gave an estimated overall economic value for the resource of $838,290 in 1971. Natural resources management decisions are becoming increasingly subject to a more explicit definition of costs and benefits. The competition for the use of scarce natural resources, in conjunction with the advent of cost-benefit and cost-effective analyses, places an urgent requirement upon management to more clearly specify program outputs in terms of their (dollar) value to people. The practical application of economic demand analysis in a non-market setting commends itself to finding a solution to many natural resources management problems. (See also W74-02201)
W74-02203

THE DEMAND FOR AND VALUE OF THE SPORT FISHERY ON THE AU SABLE, JORDAN, AND RED CEDAR RIVERS,
Michigan State Univ., East Lansing. Dept. of Park and Recreation Resources.
J. W. Pearce, and L. W. Moncrief.
Available from NTIS as PB-226 114 $3.00 in paper copy, $1.45 in microfiche. OWRR C-3381 (No 3723) (12). Supplement C of Project Completion Report, July 1973. 26 p.

Descriptors: Economics, Sport fishing, Economic impact, *Demand, *Recreation demand, *Evaluation, *Michigan.
Identifiers: Clawson's method, Angler day value, *Sport fishery.

Demand curves for sport fishing on the Au Sable, and Jordan Rivers of Michigan are presented. Data were insufficient to estimate a curve for the Red Cedar. The best estimate of the demand curve for the entire recreation experience using the Au Sable River for sport fishing is $y \pm 361.0012 - 318.8405 \log x$; for the Jordan, $\log y \pm 5.2312 - 4.2571 \log x$. Demand curves for the use of the sport fishery are derived from these curves. The value of the sport fishery is defined as the area under the demand curve for the resource alone which represents the aggregate willingness to pay for use of the resource for sport fishing. The value of the sport fishing on the Au Sable is estimated at $536,000 in 1970 and $846,000 in 1971. The Jordan sport fishery is valued at $17,000 in 1970 and $53,000 in 1971. Demand curves were estimated using the technique suggested by Marion Clawson. The data used were collected in statewide surveys of licensed anglers conducted by the Michigan Department of Natural Resources in 1970 and 1971. (See also W74-02201)
W74-02204

THE EX POST MEASUREMENT OF BENEFITS AND COSTS IN SMALL WATERSHED PROJECTS,
Georgia Univ., Athens. Inst. of Natural Resources.
P. A. Maxwell.
Available from the National Technical Information Service as PB-226 108, $9.50 in paper copy, $1.45 in microfiche. Doctoral Dissertation, May 1973. 136 p, 14 fig, 12 tab, 55 ref, 2 append. OWRR B-059-GA (1). 14-31-0001-3570.

Descriptors: *Evaluation, *Project feasibility, Project planning, River basin development, Water control, Alternative costs, *Benefits, Costs, Recreation, Flood control, Water supply, Social aspects, *Economic feasibility, *Small watersheds, *Cost-benefits analysis.

Methods available to measure the performance of public investment are developed and tested with specific attention to water resources projects for flood control, municipal and industrial water supply, and recreation. The use of 'with-without' analysis in all measurements is recommended, and a distinction is made between direct measurement techniques and indirect measurement techniques. The direct measurements attempt to measure variables showing the net benefits from each project purpose while the indirect techniques measure the growth of surrogate variables which reflect the impact of an entire project. The research uses these methods to measure the ex post performance of two PL 566 small watershed projects in Georgia, Rooty Creek and the Little Tallapoosa River. By observing the growth of income in analogue undeveloped watersheds the conclusion is reached that neither project should have been built. Sources of the discrepancies between ex ante and ex post estimates of costs and benefits from these projects are discussed, and suggestions are made on ways to improve future agency benefit-cost analyses.
W74-02212

OPTIMUM DESIGN PERIOD FOR WATER POLLUTION CONTROL PLANTS,
For primary bibliographic entry see Field 05D.
W74-02222

COST EFFECTIVENESS OF CURRENT ENVIRONMENTAL ENGINEERING PRACTICES,
Camp, Dresser and McKee, Boston, Mass.
For primary bibliographic entry see Field 05D.
W74-02225

INTERBASIN TRANSFER OR MIGRATION: AN ECONOMIC ANALYSIS OF TWO RESPONSES TO GROUND WATER DEPLETION,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 04B.
W74-02323

A GUIDE TO IMPORTANT CHARACTERISTICS AND VALUES OF FRESHWATER WETLANDS IN THE NORTHEAST.
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
For primary bibliographic entry see Field 04B.
W74-02324

CITY OF AUSTIN, TEXAS, STUDY OF WASTEWATER COLLECTION SYSTEM: PHASE I.
Horner and Shifrin, Inc., St. Louis, Mo.
For primary bibliographic entry see Field 05D.
W74-02330

METROPOLITAN WATER AND SEWER PLAN, LUBBOCK METROPOLITAN COUNCIL OF GOVERNMENTS.
Hudgins, Thompson, Ball and Associates, Inc., Lubbock, Tex.
For primary bibliographic entry see Field 03D.
W74-02331

TOMBIGBEE RIVER VALLEY WATER MANAGEMENT DISTRICT, TENTH ANNUAL REPORT.
Tombigbee River Valley Water Management District, Tupelo, Miss.

April 1973. 56 p, 10 fig.

Descriptors: *Planning, *Administration, *Water resources development, *Projects, Project purposes, *Mississippi, Conservation, Regional development, Natural resources.
Identifiers: *Tombigbee River (Mississippi).

The Tombigbee River Valley Water Management District was created by the Mississippi legislature in 1962 to provide for the development of various aspects of the Tombigbee River Basin. There are 12 member counties in the District and 3 counties are eligible to become members of the District. The District is funded by local ad valorem taxes. The main objective of the District is to cooperate with and assist every local state, and federal organization that has some responsibility for the conservation and development of the natural resources of the area. Other specific objectives include: (1) assist in the implementation of the Corps of Engineers' Tennessee-Tombigbee Waterway Project, (2) sponsor the implementation of the Corps' flood control project on the Tombigbee River and tributaries, (3) assist in the Corps' study of the Tombigbee River Basin, (4) sponsor the federal water resources planning act in the District, (5) provide public parks and recreation facilities within the District, and (6) cooperate with the State Air and Water Pollution Commission in providing the area with clean and plentiful water. The activities of the previous year are outlined and described briefly. (Poertner)
W74-02332

A WATER AND SEWER PLAN: GREENE COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 05D.
W74-02334

A WATER AND SEWER PLAN: MORGAN COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 05D.
W74-02335

A WATER AND SEWER PLAN: MADISON COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 05D.
W74-02336

A WATER AND SEWER PLAN: WALTON COUNTY, GEORGIA.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 05D.
W74-02337

REGIONAL WASTEWATER FACILITIES STUDY.
Anderson-Nichols and Co., Inc., Concord, N.H.
For primary bibliographic entry see Field 05D.
W74-02338

NORTHEAST GEORGIA AREA WATER AND SEWER SYSTEMS PLAN AND CAPITAL IMPROVEMENT PROGRAM.
Mayes, Sudderth and Etheredge, Inc., Atlanta, Ga.
For primary bibliographic entry see Field 03D.
W74-02339

THE BALANCE OF SURFACE WATER RESOURCES IN THE LOWER MESOPOTAMIAN VALLEY,
Research Inst. for Water Resources Development, Budapest (Hungary).
G. Kienitz.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 29 p, 6 tab, 2 fig, 6 ref.

Descriptors: *Water resources development, *Planning, Water requirements, Water management (Applied), Water demand, Water utilization, Irrigation, River basin development, Water supply development, River flow, Management.
Identifiers: *Iraq (Lower Mesopotamian Valley).

Experiences and views concerning the water resources development of the Lower Mesopotamian Valley, based on work with UNESCO in the area in 1971, are presented. Since the inception of active water resources development in the 1930's, Iraq has come far in the fields of data aquisition, planning and supply development. Projected development, however, was not yet evaluated in a comprehensive balance of available water resources with demands. In reviewing work toward estimating steps needed for such a balance, both the present situation and the one to be expected after the realization of prospective reservoirs and irrigation projects are detailed. The cumulative value of water resources as well as of demands were plotted in the way of longitudinal profiles progressing along rivers in a downstream direction. Results show a sharp shortage of water due to extreme specific irrigation water demands, both present and future, and point toward the necessity of detailed investigations of water management practices and balancing in this area. (Muller-Arizona)
W74-02350

EVOLVING WATER POLICY AND MANAGEMENT IN THE UNITED STATES,
Bureau of Reclamation, Washington, D.C.
W. D. Fairchild.
In: Papers, International Symposium on Water Resources Planning, Mexico City, Mexico Volume III, December 1972, 19 p.

Descriptors: *Planning, *Water management (Applied), *Water allocation (Policy), *Regional development, Water resources development, Optimum development, *Multiple purpose, Water supply development, Water quality control, Flow augmentation, Geothermal studies, Colorado River Basin, Reclamation states, National water commission, Water law, Environmental effects.

In recent years the philosophy behind water resources planning in the U.S. has been altered by changing public goals and values from a single-purpose, single-project approach to one of multiple-purpose and comprehensive regional planning. The Bureau of Reclamation has developed procedures to apply the new 'Principles and Standards for Planning Water and Land Resources' that have been proposed by the Water Resources Council, and which convey this new philosophy. These procedures are in use in the Bureau's 11-state Western U. S. Water Plan to develop comprehensive reconnaissance plans to meet the needs of the region involved and will study the feasibility of augmenting the water supply of the Colorado River by weather modification, desalting, geothermal development, and water reuse. Changing priorities of water use give greater emphasis to the purpose of municipal and industrial water, recreation, and enhancement of fish and wildlife resources. The importance of water quality is taking its place along with water quantity. Efficiency of planned systems is considered now, as well as the environmental impact of such systems. (Muller-Arizona)
W74-02358

EVALUATION OF THE REGIONAL MULTIPURPOSE ECONOMIC BENEFITS RESULTING FROM A WATER AND RELATED LAND RESOURCE DEVELOPMENT,
Idaho Univ., Moscow. Water Resources Research Inst.
K. H. Lindeborg.
Available from the National Technical Information Service as PB-226 261 $3.00 in paper copy, $1.45 in microfiche. Technical Completion Research Report, Sept. 1973, 38 p. 3 fig, 6 tab, 2 ref. OWRR C-2195 (no 3384) (1).

Descriptors: *Water resources development, *Irrigation programs, *Land development, *Multipurpose projects, *Economic feasibility, Cost-benefit analysis, Recreation, *Idaho, Model studies, Evaluation.
Identifiers: Mountain Home (Ida.).

A study area in southwest Idaho, Mountain Home, was selected for a multi-disciplinary project to determine the optimum multi-purpose development of water resources in the area. This report, one of several, focuses on two functions, irrigation and recreation, of the overall Bureau of Reclamation plan designed to meet the present and foreseeable future water needs of the area. An effort was made to conceptualize the development of the area by developing a model to measure the impact of water projects thereon, including economic benefits, though this objective was not completely realized. Sufficient data were gathered, however, to show a trend toward large development of private farms from desert land, and sales of state land for agricultural purposes. A 15 percent increase in irrigated acreage over 1909 figures is shown, with irrigation water for these new farms coming from groundwater sources and some high-lift pumping from the Snake River. Some sprinkler irrigation units are now in use. Attention is given to costs associated with increased irrigation, notably power needs. Brief mention is made of recreation possibilities, particularly pheasant hunting. (Paylore-Arizona)
W74-02439

DEVELOPMENT OF MODELS FOR ANALYZING WATER RESOURCES DEVELOPMENT AND USE WITHIN A REGIONAL FRAMEWORK,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 06A.
W74-02455

STATE WATER PLAN, PROCEEDINGS OF 18TH ANNUAL NEW MEXICO WATER CONFERENCE.

Available from the National Technical Information Service as PB-226 288, $6.75 in paper copy, $1.45 in microfiche. Conference held April 5-6, 1973, Las Cruces: New Mexico State University Water Resources Research Institute Report No 026, July 1973. 83 p. OWRR A-999-N Mex (10).

Descriptors: *Water resources development, *New Mexico, *Conferences, *Information exchange, Reviews, Documentation, Water de-

mand, Water utilization, Economics, Social aspects, Surface waters, Groundwater, Environmental control, Ecology, Water quality control, Water pollution control, National Water Commission, *Planning.

The Eighteenth Annual New Mexico Water Conference was held at the New Mexico State University on April 5-6 for the purpose of exchanging information pertaining to water resources. The papers are reproduced in the same form as that in which they were received and include: State Water Plan, by S. E. Reynolds; Population Projections for the New Mexico State Water Plan, by Lee. B. Zink; A Study of Water Used on Urban Landscapes, by Fabian Chavez III and Donald J. Cotter; Uptake of Mercury by Fish in Natural and Artificial Systems, by Don H. Baker III, Carl J. Popp, and Donald K. Brandvold; Another Rio Grande for New Mexico, by L. P. Reinig, R. I. Brasier, B. J. Donham, and W. S. Gregory; Clean Energy via Coal Gasification, by A. J. Paquette and M. R. Beychock; and Report by the National Water Commission: A Review, by Harry P. Burleigh. (See W74-02457 thru W74-02463) (Woodard-USGS)
W74-02456

STATE WATER PLAN,
S. E. Reynolds.
In: State Water Plan, Proceedings of 18th Annual New Mexico Water Conference, April 5-6, 1973, Las Cruces: New Mexico State University Water Resources Research Institute Report No 026, p 10-18, July 1973.

Descriptors: *Water resources development, *Water Resources Planning Act, *New Mexico, Federal government, State governments, Reviews, Projects, Water rights, Legal aspects, Water utilization, Irrigation, Water supply, Surface waters, Groundwater, Water importing.
Identifiers: *State water plan (N Mex).

One of the major functions of the Interstate Stream Commission is to review and comment on plans for federal water projects in New Mexico and on interstate streams in other states to make sure that New Mexico's interests are protected. This work includes cooperation in and coordination of the work of federal agencies in planning projects in New Mexico. The Commission has participated in the formulation of project plans, operating criteria, and authorizing legislation for many federal projects, including the Navajo Dam and Reservoir Project and related Navajo Indian Irrigation Project on the San Juan River, the San Juan-Chama Diversion Project, the Animas-La Plata Project on the Animas River in Colorado and New Mexico, and the Hooker Unit of the Central Arizona Project, all Bureau of Reclamation Projects and the Corps of Engineers Cochiti and Galisteo Reservoir Projects. There is underway a study of the practicability of bringing surplus water from the Mississippi River system to West Texas and Eastern New Mexico to sustain the irrigation economy based on groundwater mining. Many other projects and plans are discussed. (See also W74-02456) (Woodard-USGS)
W74-02457

POPULATION PROJECTSIONS FOR THE NEW MEXICO STATE WATER PLAN,
New Mexico Univ., Albuquerque. Bureau of Business Research.
L. B. Zink.
In: State Water Plan, Proceedings of 18th Annual New Mexico Water Conference, April 5-6, 1973, Las Cruces: New Mexico State University Water Resources Research Institute Report No 026, p 19-29, July 1973. 1 tab, 1 ref.

Descriptors: *Water resources development, *Water demand, *Projections, *Human population, *New Mexico, Estimating, Forecasting, Water utilization, Reviews, Evaluation.
Identifiers: *State water plan (N Mex).

The projections of population, employment, and income formulated as guides for water-use planning in New Mexico are the work of two separate organizations and numerous researchers. The basic philosophy underlying these projections is that the size of New Mexico's population in the forseeable future will be determined by the size of the State's employment, by the nature of its resources, and by the character of the utilization of those resources. Employment is the major determinant of population size. The assumption is that all counties in New Mexico will have greater populations in 1980 than in 1970. That is, all New Mexico counties are assumed to have already reached their lowest population level. The highest estimated population for the State in the year 2020 is 4,621,400. (See also W74-02456) (Woodard-USGS)
W74-02458

A STUDY OF WATER USED ON URBAN LANDSCAPES,
New Mexico State Univ., University Park. Dept. of Horticulture.
F. Chavez, III, and D. J. Cotter.
In: State Water Plan, Proceedings of 18th Annual New Mexico Water Conference, April 5-6, 1973, Las Cruces: New Mexico State University Water Resources Research Institute Report No 026, p 30-39, July 1973. 4 fig, 8 ref.

Descriptors: *Water utilization, *Lawns, *Urbanization, *Landscaping, *New Mexico, Sprinkler irrigation, Cities, Surveys, Rates of application, Water loss, Soil types.
Identifiers: *Urban landscapes, Lawn watering.

A study conducted to determine the water used by urban home owners in Las Cruces, New Mexico, to maintain their landscapes showed that from 40% to 65% of private metered water was used for maintaining plants in the landscape. The water quantity used was in proportion to living mesic plants. Homeowners with 90% to 100% of the space devoted to living plants applied 99% more water per home than landscapes characterized as intermediate, where living plants were maintained on only 50% to 70% of the space. A highly significant correlation coefficient of 0.738 was obtained between landscape water use and landscape size. However, approximately 38% of the average amount of water utilized for landscape irrigation is in excess of estimated optimum amounts. Renewed emphasis on education programs directed toward an attempt to encourage wise water usage is urgently needed. (See also W74-02456) (Woodard-USGS)
W74-02459

UPTAKE OF MERCURY BY FISH IN NATURAL AND ARTIFICIAL SYSTEMS,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Biochemistry.
For primary bibliographic entry see Field 05B.
W74-02460

ANOTHER RIO GRANDE FOR NEW MEXICO,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 03A.
W74-02461

'CLEAN ENERGY VIA COAL GASIFICATION',
Fluor Corp. Ltd., Los Angeles, Calif.
A. J. Paquette, and M. R. Beychock.
In: State Water Plan, Proceedings of 18th Annual New Mexico Water Conference, April 5-6, 1973, Las Cruces: New Mexico State University Water Resources Research Report No 026, p 62-77, July 1973. 4 fig, 3 tab.

Descriptors: *Coals, *Gases, *Energy conversion, *Natural gas, *New Mexico, Methodology, Pilot plants, Water requirements.
Identifiers: *Coal gasification, Lurgi coal gasification process.

The commercial gasification of coal has been practiced for at least 50 years. A natural gas shortage plus the emphasis on removal of sulfur from fuels, has accelerated the search for new sources of Substitute Natural Gas and new supplies of Liquefied Natural Gas. The Lurgi gasification process will be used in the recently announced New Mexico coal gasification project. The Lurgi pressure coal gasification process, which was developed in 1930, has proven, large-scale commercial experience. Since 1936, the Lurgi process has been used commercially in many parts of the world, including Germany, Scotland, South Africa, and Korea. (See also W74-02456) (Woodard-USGS)
W74-02462

REPORT BY THE NATIONAL WATER COMMISSION--A REVIEW,
Texas Water Development Board, Austin.
H. P. Burleigh.
In: State Water Plan, Proceedings of 18th Annual New Mexico Water Conference, April 5-6, 1973, Las Cruces: New Mexico State University Water Resources Research Institute Report No 026, p 78-83, July 1973.

Descriptors: *Water resources development, *National Water Commission, *Reviews, Water demand, Water utilization, Environmental control, Ecology, Water quality control, Water pollution control, Planning, Projections, Economics, Social aspects.

The duties of the National Water Commission as set forth in Public Law 90-515, 90th Congress, S. 20, September 26, 1968, covered a range of water subjects from a review of present and anticipated national water resources problems to a consideration of economic and social consequences of water resource development and allocation. Its task was rendered difficult because the Nation is undergoing a period of rapid change in social and environmental preferences, and these preferences have a direct bearing upon the Commission's view of its mission to determine 'what policies the Nation should adopt to ensure that its finite water resources are used in ways which yield the highest measure of welfare to society, now and in the future.' In carrying forward its work, and in the conclusions incorporated in the Review Draft of the Commission's Proposed Report, the Commission has made valuable contributions to the solution of some of the perplexing resource management problems of the Nation, and has addressed some long-needed institutional changes to reflect its view of the proper governmental posture in the light of present conditions. Particularly significant findings by the Commission are presented in this review. (See also W74-02456) (Woodard-USGS)
W74-02463

GUIDELINES FOR THE COASTAL ZONE.
Coastal Plains Center for Marine Development Services, Wilmington, N.C.
For primary bibliographic entry see Field 02L.
W74-02510

APPLICATIONS OF MULTISPECTRAL IMAGERY TO WATER RESOURCES DEVELOPMENT PLANNING IN THE LOWER MEKONG BASIN (KHEMER REPUBLIC, LAOS, THAILAND AND VIET-NAM),
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
For primary bibliographic entry see Field 07B.
W74-02590

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

COST EFFECTIVENESS IN POLLUTION CONTROL--TREATMENT OF GLUE FACTORY WASTES BY CARBON ADSORPTION SYSTEM,
Calspan Corp., Buffalo, N.Y.
For primary bibliographic entry see Field 05D.
W74-02177

WATER AND SEWERAGE IMPROVEMENTS NEEDED IN 1975 IN CHATHAM COUNTY, GEORGIA.
Chatham County-Savannah Metropolitan Planning Commission, Savannah, Ga.
For primary bibliographic entry see Field 05D.
W74-02186

FINANCING PRIVATE WATER RESOURCE DEVELOPMENT: ANALYSIS OF A STATE LOAN PROGRAM,
Wyoming Univ., Laramie. Div. of Agricultural Economics.
For primary bibliographic entry see Field 03F.
W74-02221

ECONOMIC ASPECTS OF ENVIRONMENTAL PROTECTION (IN GERMAN),
For primary bibliographic entry see Field 05G.
W74-02227

ION EXCHANGE AND ALLIED PROCESSES IN WATER RECOVERY,
Permutit Co. Ltd., London (England).
For primary bibliographic entry see Field 05D.
W74-02268

IN-PIPE WASTEWATER CLEANUP.
For primary bibliographic entry see Field 05D.
W74-02269

FLOOD CONTROL FUNDS -- 1970 REPORT TO THE LEGISLATURE.
California State Dept. of Water Resources, Sacramento.

Bulletin No 158-70, January 1971. 7 p, 3 tab.

Descriptors: *Flood control, *Projects, *Expenditures, California, *Costs, Documentation, Flood protection, Right-of-way, Relocation, Engineering structures.
Identifiers: *California Water Code, Flood control project funds.

Expenditure of state flood-control funds are reported for California from January 1 through December 31, 1970, by the Department of Water Resources and The Reclamation Board. The California Water Code requires that expenditure of such funds be reported by the 15th day of each regular session of the State Legislature. Expenditures made during the year for projects under the juridiction of the Department and the Board are presented separately. During 1970 the Department issued reallocation orders in a net amount of $5,803,907.94. Expenditures by the Department since its program's inception in 1946 total $122,380,000. The Reclamation Board expended $3,199,557 in 1970. Expenditures by the Board since its program began in 1917 total $99,295,385. (Woodard-USGS)
W74-02292

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA STEEL INDUSTRY,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 05D.
W74-02437

THE PROBLEMS AND ISSUES OF IMPLEMENTING THE FEDERAL WATER PROJECT RECREATION ACT IN THE PACIFIC NORTHWEST,
Oregon State Univ., Corvallis. Dept. of Geography.
K. W. Muckleston.
Available from the National Technical Information Service as PB-226 295, $4.50 in paper copy, $1.45 in microfiche. Oregon State University Water Resources Research Institute Completion Report WRRI-20, October 1973. 136 p, 10 fig, 16 tab, 56 ref, 2 append. OWRR B-025-ORE (1) 14-31-0001-3632.

Descriptors: *Cost sharing, *Federal-state cooperation, *Recreation, *Fish management, Political aspects, Reservoir operation, Water resource development.
Identifiers: Pacific Northwest, Washington, Oregon.

The research assesses the implementation of the Federal Water Project Recreation Act in the Pacific Northwest in particular and in the U.S. in general. By passage of the Act Congress sought to (1) place the Bureau of Reclamation and Corps of Engineers on equal ground re the provision of recreation; (2) ensure that recreation and fish and wildlife became coequals with traditional project purposes; and (3) devolve upon nonfederal entities more financial and planning responsibilities for the enhancement of recreation and fish and wildlife. Implementation of the Act is halting and uneven at best. Implementation is more difficult in the Pacific Northwest than in the rest of the U.S. Although the protracted project gestation period and relative recency of the Act preclude firm conclusions, trends are apparent: It was unrealistic for Congress to expect the Act to accomplish the three goals given the water development system in which PL 89-72 operates. In general federal agencies have been slow to relinquish planning prerogatives to the nonfederal entities, who in turn have been hesitant to cost-share what was once free. Moreover, many nonfederal entities do not have the planning expertise to make meaningful planning inputs. Recreation and fish and wildlife have not attained coequality among project purposes; and the Corps continues to retain the advantage vis-a-vis the Bureau of Reclamation in the provision of recreation. Some of the variables that appear to influence the nonfederal decision to cost-share are: the relative expense of participation, spatial priorities, philosophy of cost-sharing, importance of withholding PL 89-72 functions from the project b/c ratio, extraordinary sources of funds, receptivity to post-industrial values, constitutional limitations on indebtedness, attitude towards charging user fees.
W74-02453

6D. Water Demand

ECONOMIC EVALUATION OF THE SPORT FISHERY OF THE AU SABLE RIVER, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Park and Recreation Resources.
For primary bibliographic entry see Field 06B.
W74-02203

THE DEMAND FOR AND VALUE OF THE SPORT FISHERY ON THE AU SABLE, JORDAN, AND RED CEDAR RIVERS,
Michigan State Univ., East Lansing. Dept. of Park and Recreation Resources.
For primary bibliographic entry see Field 06B.
W74-02204

MUNICIPAL WATER PLANNING--MIXED INTEGER APPROACH,
Utah State Univ., Logan. Dept. of Civil Engineering.
For primary bibliographic entry see Field 03D.
W74-02223

WASTE WATER RESEARCH FOR THE PULP AND PAPER INDUSTRY AT THE DARMSTADT TECHNOLOGICAL INSTITUTE (ABWASSERFORSCHUNG FUER DIE PAPIER-UND ZELLSTOFFINDUSTRIE AN DER TH DARMSTADT),
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
For primary bibliographic entry see Field 05D.
W74-02257

WATER RESOURCES OF LEE COUNTY, MISSISSIPPI,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04B.
W74-02340

THE BALANCE OF SURFACE WATER RESOURCES IN THE LOWER MESOPOTAMIAN VALLEY,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 06B.
W74-02350

POPULATION PROJECTSIONS FOR THE NEW MEXICO STATE WATER PLAN,
New Mexico Univ., Albuquerque. Bureau of Business Research.
For primary bibliographic entry see Field 06B.
W74-02458

6E. Water Law and Institutions

APPROACHES TO STATE COASTAL MANAGEMENT,
Rhode Island Univ., Kingston. Coastal Resources Center.
For primary bibliographic entry see Field 02L.
W74-02185

TOMBIGBEE RIVER VALLEY WATER MANAGEMENT DISTRICT, TENTH ANNUAL REPORT.
Tombigbee River Valley Water Management District, Tupelo, Miss.
For primary bibliographic entry see Field 06B.
W74-02332

GROUNDWATER EXPLORATION AND PROVISION FROM THE HYDROGEOLOGICAL POINT OF VIEW,
Bundesanstalt fuer Bodenforschung, Hanover (West Germany).
For primary bibliographic entry see Field 04B.
W74-02353

EVOLVING WATER POLICY AND MANAGEMENT IN THE UNITED STATES,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-02358

STATE WATER PLAN, PROCEEDINGS OF 18TH ANNUAL NEW MEXICO WATER CONFERENCE.
For primary bibliographic entry see Field 06B.
W74-02456

STATE WATER PLAN,
For primary bibliographic entry see Field 06B.
W74-02457

REPORT BY THE NATIONAL WATER COMMISSION--A REVIEW,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 06B.
W74-02463

NEW CONCEPTS IN THE LAW OF THE SEA,
John Hopkins Univ., Washington, D.C. School of Advanced International Studies.
J. L. Hargrove.
Ocean Development and International Law Journal, Vol 1, No 1, p 5-12, Spring 1973.

Descriptors: *International law, *Political aspects, *Law of the sea, *Exploitation, *Administration, Regulation, Legal aspects, Governmental interrelations, Navigation, International waters, Jurisdiction, Straits, Mining, Resources development, Oceans, Pollution abatement, Fish conservation, Military aspects.

Two competing approaches to the law of the sea are discussed: the view that the coastal state should control activities in any large adjacent ocean areas, at least for various purposes which it deems important; and the view that most of the ocean should be left open to the free use of all nations. Both approaches have a good deal in common; these common characteristics are discussed. In the upcoming international conference these two competing approaches will be exhibited in competing claims for navigation rights, mineral resources, fishing, environmental protection and strategic uses. A possible solution is the concept of the whole ocean as a common resource of humankind, according to which no individual state has a right to benefit from the ocean except pursuant to arrangements sanctioned by the community. A suggested form of implementation would include: (1) a narrow territorial sea and various navigation guarantees, (2) a wide coastal band coupling coastal state managerial functions with permanent international prerogatives and (3) purely international management of the deep seabed. (Napolitano-Florida)
W74-02497

SCIENTIFIC ASPECTS OF MARITIME SOVEREIGNTY CLAIMS,
Scripps Institution of Oceanography, San Diego, Calif.
W. S. Wooster.
Ocean Development and International Law Journal, Vol 1, No 1, p 13-20. Spring 1973. 15 ref.

Descriptors: *International law, *Peru, *Continental shelf, *Boundary disputes, *Jurisdiction, Regulation, Currents (Water), Fish populations, Ecosystems, Sediment transport, Sea Water, Ocean currents, Temperature.

The scientific arguments used to justify Peruvian claims for extensions of maritime sovereignty are compared with available oceanographic information on the eastern South Pacific. Areas of discussion and dispute include: geographical characteristics of the Peruvian land area and submarine topography, territorial erosion, ocean currents and temperatures, and fishing resources. Comparison shows that oceanographic criteria appear to provide little support for the Peruvian position which is basically political rather than scientific in nature. (Napolitano-Florida)
W74-02498

INDICES OF NATIONAL INTEREST IN THE OCEANS,
Rhode Island Univ., Kingston. Law of the Sea Inst.
L. M. Alexander.
Ocean Development and International Law Journal, Vol 1, No 1, p 21-49, Spring 1973. 28 ref, 7 tab.

Descriptors: *International law, *Continental shelf, *Continental margins, *Jurisdiction, *Governments, International waters, Regime, Regulation, Institutional restraints, Boundary disputes, Leagal aspects, Mining, Beds under water, Fish, Fish conservation, Commercial fishing, Straits, Bays, Islands.

Each of the independent states of the world has a particular set of interests in the ocean. By analyzing the nature of national maritime interests it is possible both to develop a generalized model which can be applied to any state, and to devide states into groupings depending upon their physical characteristics with respect to the marine environment. The four basic components of national maritime interests are: accessibility, investment, dependence, and control. With reference to accessbility, land-locked, shelf-locked and states with large outer continental margins are discussed. In the area of investment, capital investment in distant-water fishing fleets, off-shore oil wells, merchant ships, marine recreational facilities and pollution control units are discussed. With reference to dependence, areas covered include proportion of labor force engaged in marine activity; the need for sea transportation of imports and exports; and claims of special legal treatment. Finally, in the area of control-purported area of jurisdiction and forms of jurisdiction, territorial sea, contiguous zones, exclusive fisheries, pollution prevention, fish conservation, and claims to seabed and subsoil are discussed. (Napolitano-Florida)
W74-02499

OCEAN SCIENCE AND MUTUAL ASSISTANCE: AN UNEASY ALLIANCE,
Columbia Univ., New York. Graduate School of Business.
G. Pontecorvo.
Ocean Development and International Law Journal, Vol 1, No 1, p 51-64, Spring 1973. 8 ref.

Descriptors: *International law, *Jurisdiction, *Administration, *Political aspects, *Legal aspects, Regulation, Institutional restraints, Exploitation, Law of the sea, Governments, Governmental interrelations, Government finance, Government supports, Economic feasibility, Economic justification, Cost-benefit analysis, Input-output analysis, Research and development.

Current negotiations over the law of the sea are concerned with, in part, the question of scientific research in the oceans. Historically, the narrow definition of territorial sea favored the major maritime powers and enabled ocean scientists to work relatively freely. Since World War II two major developments, the seaward extension of national jurisdiction and the attitude of certain nations toward the role of science in society, have begun to impinge on ocean research. The use of mutual assistance programs aimed at improving the capability of developing nations in ocean science is emphasized as a method of improving international relations and thereby creating a climate for relatively unimpeded ocean research. The necessary conditions for the operation of these programs, the costs associated with them and an approach for their implementation are discussed. (Napolitano-Florida)
W74-02500

DEVELOPMENT OF THE FREEDOM OF SCIENTIFIC RESEARCH ISSUE OF THE THIRD LAW OF THE SEA CONFERENCE,
Rhode Island Univ., Kingston.
J. A. Knauss.
Ocean Development and International Law Journal, Vol 1, No 1, p 93-120, Spring 1973. 1 tab, 47 ref, 2 append.

Descriptors: *International law, *Continental shelf, *Research and development, *Political aspects, Legal aspects, Boundary disputes, Jurisdiction, International waters, Oceanography, Pollution identification, Administration, Exploitation, Fish.
Identifiers: Coastal waters.

The importance of scientific research and the benefits that will flow to all mankind are explained and an attempt is made to differentiate between such research and those activities directly related to resources exploitation. It is believed that as a consequence of decisions relating to resource jurisdiction and other issues at the forthcoming Law of the Sea Conference, conduct of bona fide scientific research in the ocean will be made more difficult. Many nations view such research as a threat to their economic and political security. The concerns of the coastal nations are examined and suggestions made as to how some of these concerns may be alleviated. Certain sources of ocean pollution and their effect are briefly discussed as are opinions and proposals of the scientific community. Specific treaty language is proposed. (Napolitano-Florida)
W74-02501

CHALLENGES TO FEDERALISM: STATE LEGISLATION CONCERNING MARINE OIL POLLUTION,
Oregon Univ., Eugene. School of Law.
For primary bibliographic entry see Field 05G.
W74-02502

WETLAND FILL-RESTRICTIONS DO NOT CONSTITUTE A COMPENSABLE 'TAKING' WITHIN THE MEANING OF THE FIFTH AMENDMENT,
For primary bibliographic entry see Field 04A.
W74-02503

LEGAL DEVELOPMENTS IN CANADIAN WATER MANAGEMENT,
Department of the Environment, Ottawa (Ontario).
C. G. Morley.
Western Ontario Law Review, Vol 11, p 139-158, 1973. 134 ref.

Descriptors: *Federal-state water rights conflicts, *Canada, *Water quality, *Legislation, *Legal review, Water resources development, *Natural resources, Water quality standards, Law enforcement, Waste water pollution, Sources, Permits, Water pollution, Pollution, Governments.

Three recently enacted statutes and amendments to a fourth exemplify new Canadian federal initiatives in water law. Underlying these laws is the jurisdictional issue in that the various provinces retain ownership and the right to control the use of natural resources within their respective boundaries. The outer limits of federal jurisdiction are not defined. The first of the four statutes which are analyzed is the Canada Water Act which was enacted to provide a legislative framework within which the federal government could respond to the need for controls over water resource use and management. It provides for the creation of water quality management agencies for federal water and for non-federal waters if the water quality management of those waters has become a matter of urgent national concern. The Northern Inland Waters Act's objectives are to conserve, develop and utilize Canada's northern waters for all Canadians and particularly for the residents of the Yukon Territory and the Northwest Territory. The Arctic Waters Pollution Prevention Act and amendments to the Fisheries Act are also analyzed. (Gragg-Florida)
W74-02505

GROUNDWATER POLLUTION IN THE WESTERN STATES--PRIVATE REMEDIES AND FEDERAL AND STATE LEGISLATION,
For primary bibliographic entry see Field 05G.
W74-02506

EASEMENTS: JUDICIAL AND LEGISLATIVE PROTECTION OF THE PUBLIC'S RIGHTS IN FLORIDA'S BEACHES,
W. R. Bowdoin.
University of Florida Law Review, Vol 25, p 586-596, 1973. 69 ref, append.

Descriptors: *Florida, *Coasts, *Beaches, *Legal aspects, Common law, Legislation, Easements, Public access, Legal aspects, Judicial decisions.

An ever increasing public use of coastal beach property has resulted in private property owners restricting their beaches for their exclusive use. This exclusion problem in coastal states is leading to a reevaluation of the private owner's property rights. Court decisions in these states indicate that beach property is regarded as having a unique quality that requires different treatment from inland property. Courts of coastal states are protecting the interests and rights of the public through the use of easement theories. These courts have made use of three common law doctrines to establish public easements in private beaches: prescription, implied dedication, and custom. Legislative action is a fourth possibility. This commetary evaluates these four methods of establishing public easements and proposes judicial and legislative solutions to Florida's beach property problem. The custom doctrine is the best judicial remedy to protect the public's interest in Florida's beaches. (Sears-Florida)
W74-02508

PROPER TIME LIMITATIONS ON OUTER CONTINENTAL SHELF LEASES UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT,
W. M. Babovich.
Houston Law Review, Vol 10, p 158-168, October 1972. 64 ref.

Descriptors: *Alternative planning, *Alternative water use, *Environmental effects, *Legislation, Permits, Planning, Gulf of Mexico, Leases, Administrative agencies, Ecology, Judicial decisions, Legal aspects, Oil fields, Exploration.
Identifiers: National Environmental Policy Act, Injunctive relief, Energy requirements.

Natural Resources Defense Council v. Morton is noteworthy among environmental litigation as the first decision directly analyzing the National Environmental Policy Act (NEPA) requirement that alternatives to proposed governmental actions be studied to determine their effect on the environment. Plaintiffs, environmental groups, successfully brought suit to enjoin the acceptance of bids for oil and gas leases in the Gulf of Mexico. Plaintiffs contended that the federal agencies involved had insufficiently reviewed potential alternatives to the proposed leases. A preliminary injunction was affirmed, on the basis that the government had not sufficiently analyzed the available alternatives for satisfying the energy requirements of the Nation. Cases prior to the enactment of NEPA are surveyed, and the conclusion is that only certain federal agencies were required to consider the environmental effects of their actions. Cases subsequent to enactment of NEPA are surveyed and show that now every federal agency has a statutory mandate to investigate the environmental effects of its actions. The mandate of the NEPA is that alternatives to proposed government action be examined to the fullest extent possible. Unless courts require a study of alternatives available for the present time and for decades to come, the Nation may again face ecological problems on a crisis-by-crisis basis. (Gragg-Florida)
W74-02509

MICHIGAN STATE WATER POLLUTION CONTROL PLAN.
Michigan Water Resources Commission, Lansing.
For primary bibliographic entry see Field 05G.
W74-02511

PUBLIC ACCESS TO BEACHES: COMMON LAW DOCTRINES AND CONSTITUTIONAL CHALLENGES.

New York University Law Review, Vol 48, p 369-394, May 1973. 173 ref.

Descriptors: *Coasts, *Beaches, *Legal aspects, *Public access, Constitutional law, Public rights, Shores, Judicial decisions, Recreation, Seashores, Surf, Common law.
Identifiers: Public trust doctrine.

The need for special policies protecting public rights to the use of beaches has been recognized by the state courts and legislatures, as well as by the federal government. The diminishing access to beaches has led many citizens to institute legal action of some type. This note examines and evaluates the legal approaches open to the courts in their adjudication of such cases. It also deals with the question of whether efforts to expand public legal rights may have the adverse practical effect of limiting public access to beaches. The two major legal weapons available if the beach is privately owned are the doctrine of implied dedication and custom. If the beach is municipally owned, the doctrine of express dedication may be useful. The successful application of these theories depends on the facts of the given case. The litigant may also use the less fact-dependent theories of the jus publicum and public trust. Alternatively, he can use the constitutional argument that restrictions on municipally owned beaches deny nonresidents equal protection of the law. (Sears-Florida)
W74-02512

IN RE CHINESE MARITIME TRUST, LTD., (WRECK OBSTRUCTING NAVIGABLE WATERS OF THE PANAMA CANAL).

361 F. Supp. 1175-1179 (S.D.N.Y. 1972). 5 p.

Descriptors: *Panama Canal, *Navigable water, *Judicial decisions, *Navigation, *Rivers and Harbors Act, Ships, Legislation, Legal aspects, Canal zone, Canals.
Identifiers: Admiralty, Navigation obstructions.

A wreck obstructed the navigable waters of the Panama Canal. The Panama Canal Company, a government-owned corporation, sought a declaration that action for the cost of removal of a wreck obstructing navigable waters of the Panama Canal Zone was not subject to a restraining order entered in a limitation of liability proceeding. By federal statute, a ship owner can limit his liability for losses caused by the ship if those losses were incurred without the privity or knowledge of such owner. The United States District Court found as a matter of law that liability in removing wrecks was within the privity and knowledge of the owner and therefore not subject to limitation. The court made no determination on the absolute liability of the shipowners as to be held ultimately liable for the removal costs. Thus, there must be a showing that the ship was negligently sunk. The court here only precluded the shipowner from limiting his liability. (Gragg-Florida)
W74-02513

YOFFE V. SPECIAL BOARD, CHAPTER 387, (STATE DENIAL OF LICENSE TO EXPLOIT NATURAL RESOURCES OF A LAKE BED).

304 A.2d 876-879 (N.H. 1973). 4 p.

Descriptors: *Lake beds, *Dredging, *Permits, *State governments, *Legal review, Judicial decisions, Mining, *New Hampshire, Legislation, Exploitation.

Plaintiff, an individual, was denied a license to exploit natural resources located on a lake bed belonging to the State of New Hampshire by a Special Board created by the New Hampshire legislature for the purpose of deciding matters relative to resources of the state, including but not limited to excavating, dredging and filling waters of the state. The issue was whether the plaintiff was entitled to avail himself of certain statutory judicial review provisions. The state supreme court held that the plaintiff was not entitled to judicial review of the Board's decision. The court held that the statutory judicial review provisions relied on by the plaintiff were only applicable to Board decisions involving privately owned wetlands. The purpose of the review mechanism was to assure judicial scrutiny of regulation which can potentially reach a degree of restrictiveness that amounts to a taking of private property for which compensation must be paid. The court found no reason for extending this judicial protection beyond the 'privately owned wetlands situation'. (Gragg-Florida)
W74-02514

SALMON FALLS DIVISION, UPPER SNAKE RIVER PROJECT, IDAHO, PART 11.
Hearing--Subcomm. on Irrigation and Reclamation--Comm. on Interior and Insular Affairs, U.S. House of Representatives, 92d Cong, 2d Sess, May 15, 1972. 166 p.

Descriptors: *Legislation, *Irrigation, *Wildlife management, *Idaho, Water distribution, Drainage facilities, Aquatic environment, Flood control, Economics, Water resources development, Watershed management, Habitat improvement, Water management (Applied).

The Secretary of the Interior is authorized to construct, operate, and maintain the Salmon Falls division of the Upper Snake River Project in Idaho. The principal works of the division would consist of the Milner pumping plant, the Milner-Salmon Falls Canal, relief and pumping stations, water distribution facilities, and wells to provide supplemental water, and drainage facilities. The primary purposes served by the project would be irrigation and fish and wildlife enhancement. The available surface and ground water supplies of the service area have been fully utilized by local interests for irrigation but are inadequate to serve the 49,380 acres presently developed. The proposed facilities of the Salmon Falls division, together with existing facilities, would provide a full supply of water for the irrigation of 64,110 acres of land on the southside of the Snake River in Southern Idaho, including the lands now developed. The construction cost of the division is estimated at $47,252,000. (Mockler-Florida)
W74-02515

RIVER BASIN MONETARY AUTHORIZATIONS--DISASTER RELIEF ACT AMENDMENTS.
Hearing--Subcomm. on Flood Control and Internal Development--Comm. on Public Works, U.S. House of Representatives, 92d Cong, 1st Sess, November 30, 1971. 50 p.
Identifiers: *Legislation, *River basin development, *Economics, *United States, *Federal budget, Legal aspects, Water resources development, Flood control, Comprehensive planning, River basins, Water supply, Watershed management.

A bill would authorize additional appropriations for prosecution of projects in certain comprehensive river basin plans for flood control and navigation; provide for contributions by the federal

government to repair, restore, reconstruct, or replace nonprofit hospitals under the provisions of the 1970 Disaster Relief Act; provide federal financial assistance for the reconstruction or repair of private nonprofit medical care facilities which are damaged or destroyed by a major disaster; and amend the Disaster Relief Act of 1970 to authorize disaster loans with respect to certain losses arising as the result of recent natural disasters. The River Basin Monetary Authorization Act of 1970 provided funds for two calendar years to be used in thirteen river basins and for individual projects in these basins throughout the United States. The monetary authorization for certain of the river basin plans will become exhausted in a short time; therefore, it became necessary for the Congress to act on additional authorizations for funds so there will not be a discontinuance nor interruption of the projects. (Mockler-Florida)
W74-02516

COLEMAN V. FORISTER (SUIT TO ESTABLISH RIGHT OF USE OF LAND FOR INGRESS AND EGRESS TO CREEK WATERFRONT).

497 S.W.2d 530-534 (Texas 1973). 5 p.

Descriptors: *Judicial decisions, *Easements, *Banks, *Boundary dispute, *Public access, *Texas, Legal aspects.
Identifiers: Injunctive relief, Egress, Ingress, Water rights (Non-riparians).

Plaintiffs, landowners, had secured an injunction which ordered the defendants to remove a building which obstructed plaintiffs' right of ingress and egress to a creek. The defendants appealed. The plaintiffs based their claim on a conveyance which was to make waterfront privileges available. The Texas Court of Appeals, after finding that the structure would interfere with the ingress and egress of the plaintiffs, upheld the injunction, finding that the defendants had constructed the structure with full knowledge and appreciation of the risks involved in the pending litigation. (Gragg-Florida)
W74-02517

ENVIRONMENTAL PROTECTION ACT OF 1973, FIRST SESSION ON S.1104.

Hearings--Subcomm. on the Environment--Comm. on Commerce--U.S. Senate, 93d Cong, 1st Sess, April 2 and 5, 1973. 342 p.

Descriptors: *Environmental protection, *Environmental control, *Legislation, *United States, Preservation, Interstate commerce, Legal aspects.
Identifiers: Congressional hearings, Standing (Legal).

The objectives of this bill are to extend the concept of standing to sue government agencies and private parties, to remove restrictions on judicial review of administrative action, and to grant to citizens the right to sue to enforce federal agency regulations. This bill would establish a system of actual notice to potential plaintiffs for the purpose of encouraging them to join in the same litigation, thus reducing the number of suits. It would also provide for a consolidation procedure to permit merging of suits brought in different courts against the same defendant. The stated purpose of this bill is to promote and protect the free flow of interstate commerce without reasonable damage to the environment; to assure that activities which affect interstate commerce will not unreasonably injure environmental rights; to provide a right of action for relief for protection of the environment from unreasonable infringement by activities which affect interstate commerce and to establish the right of all citizens to the protection, preservation, and enhancement of the environment. (Daniels-Florida)
W74-02518

GENOVA V. CITY OF KANSAS CITY (NUISANCE ACTION BROUGHT BY LANDOWNER AGAINST CITY FOR DAMAGE TO PROPERTY ALLEGEDLY CAUSED BY FLOW OF SURFACE WATERS FROM CITY-OWNED CEMETERY).

497 S.W.2d 555-560 (Missouri 1973). 6 p.

Descriptors: *Judicial decisions, *Storm runoff, *Surface runoff, *Urban drainage, *Groundwater, Storm drains, Drain runoff, *Missouri, Rainfall intensity, Drainage water, Act of God.

The defendant, City of Kansas City (City), appealed a monetary judgment recovered by the plaintiff property owner for water damage done to plaintiff's building. The water damage was a result of the City's failure to properly maintain the boundaries of a cemetery owned by it, which allowed surface water collected in the cemetery during heavy rains to flow onto the plaintiff's land. The Missouri Court of Appeals found that the evidence supported the jury's findings that deterioration of a tile drain allowed water to collect and to be released in unnatural or increased volume onto plaintiff's property. The court found this constituted a nuisance. The defendants contended that the damage was caused by an act of God. The court defined an act of God as an event in nature so extraordinary that the history of climatic variations in the locality affords no reasonable warning of their coming. The court found that this issue had been resolved by the jury as not constituting an act of God. (Gragg-Florida)
W74-02519

STATE OF NEW JERSEY, DEPARTMENT OF ENVIRONMENTAL PROTECTION V. JERSEY CENTRAL POWER AND LIGHT COMPANY (ACTION TO ENFORCE PENALTY PROVISION FOR DISCHARGE OF HARMFUL SUBSTANCE INTO TIDAL WATERS).
308 A 2d 671-674 (N.J. 1973). 4 p.

Descriptors: *Judicial decisions, *Penalties (Legal), *Discharge, *Fishkill, *Discharge (Water), Electric generators, Tidal waters, Legal aspects, Law enforcement, *New Jersey, Fish, Cooling, Industrial water, Heat balance, Thermal pollution, Pollution abatement.

The plaintiff, the New Jersey Department of Environmental Protection, brought action against the operator of an electric generator plant for discharge of a harmful substance into tidal waters. The state sought to enforce penalty provisions for such discharge and also to collect damages from a fish kill caused by the discharge. The discharge resulted from the operation of the defendant which pumped water from one river, used it for cooling purposes and discharged it into another creek. The water discharged was warmer due to its cooling function. On the date of the discharge in question the defendant shut down its generator but continued to discharge water which was substantially cooler due to the shutdown. This lowering of the temperature caused a fish kill. The Superior Court of New Jersey found such discharge to fall within the statutory prohibition and fined the defendant. The court also charged the defendant with the value of the fish killed based on the state's obligation to ensure that the rights of the public to a viable marine environment are protected. (Gragg-Florida)
W74-02520

BARTA V. BRINEGAR (CIVIL ACTIONS BROUGHT AGAINST FEDERAL AND STATE OFFICIALS SEEKING TO ENJOIN CONSTRUCTION OF HIGHWAY SEGMENT UNTIL COMPLETION OF ENVIRONMENTAL IMPACT STUDY).
358 F. Supp. 1025-1031 (W.D. Wis. 1973). 6 p.

Descriptors: *Wetlands, *Judicial decisions, *Legislation, *Highway effects, *Environmental effects, Habitats, Highways, Marshes, *Wisconsin, Federal government, Administration, Life cycles, Aesthetics, Conservation, Ecology.
Identifiers: Injunctive relief, National Environmental Policy Act, Environmental impact statement.

The construction of a highway by the state of Wisconsin was sought to be enjoined by plaintiff landowners until a study of the impact on the environment has been completed pursuant to the National Environmental Policy Act (NEPA). The segment of highway in question passes through a marsh. The state contended that an impact statement was unnecessary based on guidelines of the Federal Highway Administration (FHWA). These guidelines provide that an impact statement need not be prepared if the project received design approval before February 1, 1971, and this project had received its approval prior to this date. The United States District Court found that the plaintiffs had standing to bring the action because the disputed construction would injure their aesthetic, conservational and recreational interests. The court then proceeded to override the FHWA transitional guidelines and granted an injunction until a NEPA impact statement could be prepared. (Gragg-Florida)
W74-02521

U.S. V. AMERICAN CYANAMID COMPANY (ACTION FOR DISCHARGE INTO NAVIGABLE WATERWAYS).

480 F.2d 1132-1135 (2d Cir. 1973). 4 p.

Descriptors: *Water pollution, *Chemical wastes, *Industrial wastes, *Water pollution control, *Judicial decisions, Law enforcement, Penalties, Legislation, Pollution abatement, Navigable waters, Streams, Protective coatings, Plastics.
Identifiers: Refuse Act of 1899.

Appellant, American Cyanamid Company, appealed from a conviction of discharging refuse into a tributary of navigable water in violation of the Refuse Act of 1899. The plaintiff operates its Standard Coated Products plant on the bank of a brook one mile from where the brook flows into the Hudson River. As a result of employee negligence a storage tank in the basement of the appellant's plant overflowed, releasing a mixture of titanium dioxide and calcium carbonate into the brook. The sole question of law involved was whether the government must establish beyond a reasonable doubt that the particular refuse discharge actually was washed into navigable water or whether it was only necessary to show that the discharge of refuse was extensive enough so it would be likely to be washed into the navigable water. The court, after reviewing the legislative history of the Refuse Act, followed the precedent of the United States Supreme Court that the Act should be interpreted broadly. The court thus held that it was not necessary to prove that the discharge actually reached navigable water. (Gragg-Florida)
W74-02522

CAMDEN SPECIAL ROAD DISTRICT OF RAY COUNTY V. TAYLOR, (ACTION BY SPECIAL ROAD DISTRICT FOR MANDATORY INJUNCTION COMPELLING LANDOWNERS TO REMOVE LEVY AND TO PERMANENTLY ENJOIN THEM FROM CONSTRUCTING LEVY).

405 S. W.2d 93-100 (Mo. Ct. App. 1973).

Descriptors: *Obstruction to flow, *Groundwater barriers, *Judicial decisions, *Surface drainage, *Flooding, Surface runoff, State jurisdiction, State government, Flood control, Levee, *Missouri, Legislation.
Identifiers: Common enemy rule.

Appellant, private landowner, appealed from an action by a special road district in which a mandatory injunction had been granted compelling the landowner to remove a levee and to permanently enjoin him from constructing a levee which would bar or impede the flow of water in the area of a public road. The action resulted from the construction of a private road by the landowner which in effect became a levee that caused the public road to be inundated. Landowner asserted an unqualified right to construct and maintain the private road by reason of the 'common enemy doctrine'. The special road district contended that the private road created a public nuisance, or in the alternative, that a state statute created an exception to the doctrine when a public road is involved. The appellate court in dissolving the injunction failed to find a public nuisance, reasoning that if the road were found to be a public nuisance because of the stoppage of the flow of surface water over the landowner's property then the whole doctrine on which the right of stoppage of surface water is based would be overthrown. The court also held that the Missouri statute did not abrogate the 'common enemy doctrine' in cases involving public roads. (Gragg-Florida)
W74-02523

ENVIRONMENTAL DEFENSE FUND, INC. V. FROEHLKE (ACTION BROUGHT FOR DECLARATORY JUDGMENT AND INJUNCTION RESTRAINING COMPLETION OF RESERVOIR PROJECT).

477 F.2d 1033-1037 (8th Cir. 1973). 5 p.

Descriptors: *Judicial decisions, *Dams, *Environmental effects, *Federal, *Arkansas, Navigation, Comprehensive planning, Dam construction, Structures, Ecology, Highway relocation, Preservation.
Identifiers: National Environmental Protection Act, Environmental impact statement, Injunctive relief.

Appellant, Environmental Defense Fund, Inc., sought an injunction restraining all construction of the Truman Dam and Reservoir Project on the Osage River in Missouri, pending the filing of an environmental impact statement by the Corps of Engineers in accord with National Environmental Policy Act. The court enjoined the Corps from proceeding with certain activities and contracts, but permitted them to continue on-going construction activities, road relocation, cemetery relocations, voluntary property acquisition and design contracts pending the filing of the final environmental impact statement. The Environmental Defense Fund appealed this partial injunction. The Court of Appeals affirmed the partial injunction finding that the trial court had not abused its discretion in granting limited injunctive relief. The court based its decision on the findings that the river and life within it would not be harmed while the environmental impact statement was being completed, and that only minimal environmental damage would be inflicted on the adjacent land during that period. (Gragg-Florida)
W74-02524

STATE OF MAINE V. M/V TAMANO (SUIT TO RECOVER DAMAGES INCURRED AS RESULT OF DISCHARGE INTO WATERS OF BAY).

357 F.Supp. 1097-1102 (D. Maine, S.D. 1973). 6 p.

Descriptors: *Oil spills, *Oil pollution, *Maine, Water pollution, State jurisdiction oil waste, Natural resources, Judicial decisions, Legal aspects, Oily water, Pollution abatement.

The state of Maine and the Board of Environmental Protection brought suit against defendant corporation for discharge from an oil tanker into the local bay. Plaintiffs sought damages in three categories: for damage to state owned property, for payment of third party claims and clean-up costs, and for the state and the state as trustee for the citizens of Maine of all natural resources. The third contention was contested by the defendants. The court recognized suits of a state, parens patriae, so that a state may care for its own in utilizing the bounties of nature within her borders because it technically owns these bounties. Thus, the defendants' protest was unsuccessful. (Daniels-Florida)
W74-02525

UNITED STATES V. LINDSAY (GOVERNMENT'S ACTION AGAINST CITY FOR ALLEGED VIOLATION OF REFUSE ACT AND NEW YORK HARBOR ACT, AND FOR CREATION OF PUBLIC NUISANCE).
357 F. Supp 784-794 (E.D. New York, 1973). 11 p.

Descriptors: *Sewage disposal, *Municipal wastes, *Sewage, *Refuse Act, *New York, Water pollution, Industrial wastes, New York Harbor Act, United States, Legislation, Judicial decisions, Governmental interrelations, Waste water disposal, Seepage, Regulation.

Plaintiff, United States Government, alleged violation of Refuse Act and New York Harbor Act and creation of a public nuisance against defendant City of New York. City's discharges from streets and sewers in liquid state flow into the surrounding navigable waters of United States. Plaintiff charged such disposal of industrial pollutants via the municipal sewer system is violation of Acts and a public nuisance under federal common law. Defendant city argued that it falls within the exemption clause which permits sewage in liquid state and further contended that federal common law may only be fashioned where no federal statute exists. The court found defendant city properly within the exemption clause even though the sewage contained some inorganic matter. The court was not prepared, at this time, to determine the defendant's claim that plaintiff may not resort to federal common law. (Daniels-Florida)
W74-02526

SEGARS V. CORNWELL (PROPERTY OWNER SUES FOR MALICIOUS PROSECUTION AGAINST CORPORATION).
196 S.E.2d 341-346 (Ct. App. Ga., Division No. 1, 1973). 6 p.

Descriptors: *Water law, *Land development, Judicial decision, Legal aspects, Recreation, *Georgia.
Identifiers: Intentional torts, Water rights (Nonriparian).

The plaintiff had purchased fifteen acres of land from the Swan Lake Development Company. The deed stated that the conveyance included lake privileges. Due to errors in the legal description, a second deed was written in which, however, the sentence concerning the lake privileges was omitted. For a time, the plaintiff paid to the defendant developer an assessment for the upkeep of the recreational facilities; when he ceased the payments, the defendant forbade him use of the lake and ultimately swore out a warrant for his arrest, charging him with criminal trespass. The plaintiff successfully defended the charge and then sued the defendant for malicious prosecution. The court found that when a subdivision is developed and sold by an owner by the establishment of a general scheme, in reliance upon which the lots are purchased, an obligation rests upon the developers to make such land use available to all purchasers equally. The court concluded that the subdivision was planned, the lake constructed, and the recreation areas set aside for the purpose of selling lots so that if the lots were contiguous to the waterfront or not, the defendant could not deny the plaintiff access to the lake. (McKnight-Florida)
W74-02527

A BILL TO PRESCRIBE PROCEDURES SO AS TO MAKE ADMINISTRATION OF THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 MORE EFFECTIVE.

House Bill No. 5974, 93rd Cong, 1st Sess, March 21, 1973. 10 p.

Descriptors: *Legislation, *Administration, *United States, *Environment, *Environmental effects, Effects, Administrative agencies, Environmental control, Ecology, Social aspects, Legal aspects, Political aspects, Water policy, Water law, Administrative decisions, Regulation, Federal government.
Identifiers: National Environmental Policy Act of 1969, Environmental impact statement.

Amendments were proposed to the National Environmental Policy Act of 1969 (Act) so as to make administration of the Act more effective. The amendments proposed that the Act be clarified to more precisely define the procedural requirements placed upon federal departments and agencies so as to eliminate delay, duplication and overlap, as well as to weigh environmental values with other public interests and values and to balance environmental values with other national policies and goals. Specifically, the amendments require that in connection with any proposed federal legislation or major federal action significantly affecting the quality of the human environment, an environmental impact statement will be developed assessing the environmental impact of the proposed legislation, adverse environmental effects, and alternatives to the proposed action. (Glickman-Florida)
W74-02528

A BILL TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE POLLOCK-HERREID UNIT, SOUTH DAKOTA PUMPING DIVISION, MISSOURI RIVER BASIN PROJECT, SOUTH DAKOTA.

Senate Bill No. 1577, 93rd Cong, 1st Sess, April 13, 1973. 2 p.

Descriptors: *River basins, *River basin development, *Irrigation, *Water supply, *South Dakota, Land management, Water supply, Irrigation, Operation and maintenance, Irrigation systems, Water storage, Structures, Reservoir construction, Reservoir operation, Reservoir sites, Reservoir, Reservoir storage, Wildlife conservation, Legislation, United States.
Identifiers: Missouri River Basin Project.

A bill authorizes the Secretary of the Interior to construct, operate and maintain the Pollock-Herreid unit, South Dakota pumping division of the Missouri River Basin project for the purposes of irrigation, municipal and industrial water supply and fish and wildlife enhancement. The principal works of the project include the main pumping plant, the storage reservoir, a system of main canals and laterals, a regulating reservoir, seven relift pumping plants and the necessary drainage facilities. (Glickman-Florida)
W74-02529

CITY OF HOLLYWOOD V. YARBOROUGH (REVIEW OF PUBLIC SERVICE COMMISSION ORDER AUTHORIZING UTILITY TO PROVIDE WATER SERVICE IN UNINCORPORATED AREA WHICH PETITIONER CLAIMED TO HAVE EXCLUSIVE CONTROL OVER).

274 So. 2d 526-529 (Fla. 1973).

Descriptors: *Florida, *Public utilities, *Water works, *Water supply, Water distribution (Applied), Regulation, Competition, Judicial decisions, Legal aspects, Cities, Legislation, Monopoly.

Identifiers: Notice, Public service commission.

The City of Hollywood (City) as petitioner brought suit challenging a Public Service Commission (Commission) order authorizing Modern Pollution Control, Inc. (Modern) to provide water service in an area over which the City of Hollywood alleged that it had exclusive control. The petitioner maintained that the Commission had exceeded its authority by assigning a portion of the City's territory to Modern. The court found that while the Commission is prohibited from asserting regulatory jurisdiction over the City, it is at the same time given jurisdiction over the issuance of certificates authorizing a utility to provide water services to the public and that this is so even when to do so will create competition with any other water system, if the Commission determines that such other system is inadequate to meet the reasonable needs of the public. In the situation at bar, the Commission was not, the court concluded, trying to regulate the operation of the City's water service, but only to provide water services to meet public needs in the area in question. Under these circumstances, any regulatory effect on the City was so indirect that it was overcome by the needs of the public so that the order in question was valid. (McKnight-Florida)
W74-02530

CANYON PUBLIC SERVICE DISTRICT V. TASA COAL COMPANY (EMINENT DOMAIN PROCEEDING HELD PUBLIC SERVICE DISTRICT HAD RIGHT TO CONDEMN DEFENDANT'S LANDS FOR USE IN CONNECTION WITH SEWER FACILITIES, DEFENDANT APPEALS).

195 S.E.2d 647-653 (Sup. Ct. App. W.Va. 1973).

Descriptors: *Eminent domain, *Condemnation, *Public utility district, Sewerage disposal, Public utilities, Sewage districts, Judicial decisions, Sewerage, *West Virginia.

Plaintiff, a public service district, brought eminent domain proceeding against defendant corporation to condemn defendant's lands for use in connection with sewer facilities. Defendant contended that plaintiff was not a legally constituted public service district because: less than 100 voters resided and owned property in the district at the time of its creation; petitioner was created solely for the purpose of supplying water; and the order fixing the date for hearing didn't comply with statutory requirements. Court found no merit in the first contention since the county court could create the district on its own motion. On the other questions, the court held that substantial compliance with statutory requirements was sufficient but since the district was created only for the purpose of furnishing water services, it had no power to condemn real estate for sewage facilities. (Daniels-Florida)
W74-02531

KELLY V. ALPSTETTEN ASSOCIATION, INC. (ACTION TO ENJOIN TERMINATION OF WATER SERVICE, WHEREIN DEFENDANT COUNTERCLAIMED FOR BACK CHARGES).
303 A.2d 136-139 (Vt. 1973).

Descriptors: *Spring waters, *Water rights, *Prescriptive rights, Water service, Injunction, Water supply, Underground water, Public utilities, Water distribution (Applied), Judicial decisions, Legal aspects, *Vermont.

Plaintiff brought a declaratory action seeking to prevent the shutting off of water to premises owned by him and to have his rights to take water from the system declared. The defendant, owner of the water system, countered, seeking to establish a duty in the plaintiff to pay for his water service and to confirm the defendant corporation's right to terminate service. The state supreme court held that where the issue of whether defendant was entitled to shut off water to premises owned by plaintiff depended on factual determination with respect to public nature of defendant not made by trial court in granting an injunction, remand was necessary for such determination. (Daniels-Florida)
W74-02532

LEGAL AND INSTITUTIONAL CONSTRAINTS IN CONSOLIDATING IRRIGATION SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Economics.
For primary bibliographic entry see Field 03F.
W74-02533

STATE V. PLACID OIL COMPANY (ACTION BY STATE TO ESTABLISH ITS OWNERSHIP OF SUBMERGED LANDS).

274 So. 2d 402-432 (Ct. App. La. 1973).

Descriptors: *Louisiana, *Judicial decisions, *Submerged lands, Leases, Oil industry, Natural resources, Exploitation, Oil reservoirs, Ownership of beds, Boundaries (Property), High water mark, Low water mark, Watercourses (Legal aspects).

A petitory action by the State of Louisiana and its mineral lessee to have the state declared the owner of parcels of land lying below ordinary high-water-mark of a body of water alleged to be a stream is described. Plaintiff also asked for an accounting of proceeds of oil wells drilled by the defendant oil companies on the subject property. The Court of Appeals prospectively applied a 1952 statute. The statute indicated that any ownership changes which resulted from a change of course of a navigable stream which followed the date of the 1956 mineral lease from the state were without prejudice to the lessee's interest with respect to the owners of such land or water bottoms. As a result the action was remanded for the limited purpose of permitting the litigants to establish the ordinary low-water mark in the areas of controversy as of the date of the 1956 lease. Moreover, the court emphasized that the statute was not unconstitutional as long as it was given prospective and not retrospective effect. (Mockler-Florida)
W74-02534

REGIONAL WATER, SEWAGE, AND SOLID WASTE DISTRICTS.
For primary bibliographic entry see Field 05D.
W74-02535

LEVEES AND DRAINS--CHANGE OF WATER--COURSES.
Indiana Ann. Stat. secs 48-4602 thru 48-4651 (Supp. 1972).

Descriptors: *Indiana, *Statutes, *Levees, *Drainage, Water control, Legal aspects, Flood control, Drainage systems, Routing, Water distribution, Water conveyance, Supply, Transfer, Water supply, Water utilization, Roads.

Indiana Annotated statutes deal with levees, drains, and changes of watercourses. The statutes provide that the board of public works may appropriate land for the purpose of constructing a levee for the prevention of the overflow of lands and may also build a street upon the levee. Moreover, when land is appropriated for this purpose, the board is authorized to adopt a resolution declaring that purpose and to proceed with the proper plans and specifications for the proposed works, which records shall be open to the public. Final orders, damages, benefits, appeal procedures, assessments and liens, contracts, with landowners, drainage improvement proceedings, hearings, notice requirements, petitioning procedures, and the right to acquire property for the completion of work or improvements are also dealt with by the statutes and applicable annotations. (Mockler-Florida)
W74-02536

SOIL AND WATER CONSERVATION DISTRICTS.
Ala. Code tit 2, secs 659 (1) thru 663 (Supp. 1971).

Descriptors: *Legislation, *Soil conservation, *Alabama, *Erosion control, Administration, Jurisdiction, Land use, Planning, Soil erosion, Vegetation establishment, Soil stabilization, Conservation, Land development.

An act by the Alabama Legislature changes the name of the State Soil Conservation Committee and Soil Conservation districts, create soil and water conservation districts, disannexes territory from one district and includes it in another, and changes the name of several soil districts. Moreover, the Act provides that a soil and water conservation district organized under the provisions of this chapter shall constitute a governmental subdivision of the state and a public body corporate and politic, exercising public powers, and such districts shall have the power to carry out preventive and control measures including engineering operations, methods of cultivation, the growing of vegetation, changes in use of land, and other erosion control measures on lands owned or controlled by the state. It may also conduct surveys, investigations, and research relating to the character of soil erosion and the preventive and control measures needed; publish the results of such surveys; and disseminate information concerning such preventive and control measures. (Mockler-Florida)
W74-02537

SUBMERGED LANDS.
43 U.S.C. secs 1301 thru 1343 (1970).

Descriptors: *Legislation, *Submerged lands, *United States, *Continental shelf, Tidal waters legal aspects, Jurisdiction, Governments, Intergovernmental relations, Oil leases.

These are the United States Code sections dealing with submerged lands. The statutes provide that it is in the public interest that title to and ownership of the lands beneath navigable waters within the boundaries of the respective states, the natural resources within such lands and waters, and the right and power to manage, administer, lease, develop, and use the lands and natural resources be confirmed and established. Moreover, the statutes provide that the Constitution and laws of the United States are extended to the subsoil and seabed of the outer continental shelf and to all artificial islands and fixed structures which may be erected thereon for the purpose of exploring for, developing, removing, and transporting resources therefrom, to the same extent as if the Outer Continental Shelf were an area of exclusive federal jurisdiction located within a state. The statutes also provide for seaward boundaries of states, rights and powers retained by the United States, administration of leasing, validation and maintenance of prior leases, and granting of leases by the Secretary of the Interior. (Mockler-Florida)
W74-02540

6F. Nonstructural Alternatives

FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA,
Montana Univ., Missoula.
For primary bibliographic entry see Field 04A.
W74-02215

6G. Ecologic Impact of Water Development

WETLAND FILL-RESTRICTIONS DO NOT CONSTITUTE A COMPENSABLE 'TAKING' WITHIN THE MEANING OF THE FIFTH AMENDMENT,
For primary bibliographic entry see Field 04A.
W74-02503

OGUNQUIT SAND DUNE LAND STABILIZATION MEASURE, YORK COUNTY IN MAINE, THRESHOLD TO MAINE RESOURCE CONSERVATION AND DEVELOPMENT PROJECT (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Orono, Maine
For primary bibliographic entry see Field 04A.
W74-02504

ENVIRONMENTAL PROTECTION ACT OF 1973, FIRST SESSION ON S.1104.
For primary bibliographic entry see Field 06E.
W74-02518

BARTA V. BRINEGAR (CIVIL ACTIONS BROUGHT AGAINST FEDERAL AND STATE OFFICIALS SEEKING TO ENJOIN CONSTRUCTION OF HIGHWAY SEGMENT UNTIL COMPLETION OF ENVIRONMENTAL IMPACT STUDY).
For primary bibliographic entry see Field 06E.
W74-02521

ENVIRONMENTAL DEFENSE FUND, INC. V. FROEHLKE (ACTION BROUGHT FOR DECLARATORY JUDGMENT AND INJUNCTION RESTRAINING COMPLETION OF RESERVOIR PROJECT).
For primary bibliographic entry see Field 06E.
W74-02524

07. RESOURCES DATA

7B. Data Acquisition

A NEW OSCILLATING WATER TUNNEL,
Queen's Univ., Kingston (Ontario). Coastal Engineering Research Lab.
For primary bibliographic entry see Field 02J.
W74-02160

A SHEAR PLATE FOR USE IN OSCILLATORY FLOW,
Queen's Univ., Kingston (Ontario). Coastal Engineering Research Lab.
For primary bibliographic entry see Field 02E.
W74-02161

DETECTION OF POLLUTANTS IN WATER BY RAMAN SPECTROSCOPY,
Brown, Boveri und Cie, A.G., Heidelberg (West Germany).
For primary bibliographic entry see Field 05A.
W74-02164

CALIBRATING A WATER YIELD MODEL FOR SMALL UNGAGED WATERSHEDS,
Kentucky Dept. of Natural Resources, Frankfort. Div. of Water.
For primary bibliographic entry see Field 02A.
W74-02172

HYDROLOGIC SIMULATION MODEL OF COLORADO SUBALPINE FOREST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. F. Leaf, and G. E. Brink.
USDA Forest Service Research Paper RM-107, May, 1973. 23 p. 1 tab, 10 fig, 1 append, 20 ref.

Descriptors: *Forest watersheds, *Watershed management, Hydrologic systems, *Simulation analysis, Model studies, *Water balance, *Computer models, Computer programs, Snowmelt, Evapotranspiration, Vegetation effects, Forest management, Coniferous forests, *Colorado.
Identifiers: Subalpine hydrology.

A simulation model specifically designed to determine the probable hydrologic changes resulting from watershed management in the Colorado subalpine zone is described. The model simulates the total water balance on a continuous year-round basis and compiles the results from individual hydrologic response units into a composite overview of an entire drainage basin. Preliminary results for an 8-year test period on a 667-acre experimental watershed are summarized. (Brown-IPC)
W74-02248

AN ENCLOSED WEIR FOR SMALL STREAMS IN SNOW COUNTRY,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
K. L. Johnson, and R. D. Tabler.
USDA Forest Service Research Note RM-238, May 1973. 8 p. 7 fig, 2 ref.

Descriptors: Watershed management, *Weirs, *Flow measurement, *Winter, *Streamflow, Engineering structures, Costs, Operating costs, Capital costs, Snow.
Identifiers: Measurement systems.

An enclosed, sharp-crested, V-notch weir was designed to gage small channels under severe winter conditions at reduced costs of installation and operation. The self-contained structure consists of a multiplate pipe arch with closed ends fitted over and independent cutoff wall. The instrument shelter is mounted directly on the arch over a stilling well assembly placed within the weir basin. The structure provides trouble-free winter operation. Compared to a conventional design, the time of construction was reduced 50% and total costs by 40%. (Brown-IPC)
W74-02249

ULTRASONIC RIVER FLOW MEASUREMENT,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 02E.
W74-02250

COMPARISON OF RAINGAUGE EVAPORATION SUPPRESSANTS,
Otago Univ., Dunedin (New Zealand). Dept. of Geography.
For primary bibliographic entry see Field 02D.
W74-02289

DESIGN, OPERATION, AND TEMPERATURE SENSITIVITY OF A THERMOCOUPLE PSYCHROMETER MOISTURE POTENTIOMETER BASED ON THE PELTIER EFFECT, (KONSTRUKTSIYA, METODIKA PRIMENENIYA I TEMPERATURNAYA CHUVSTVITEL'NOST' TERMOPARNOGO PSIKHROMETRICHESKOGO VLAGOPOTENTSIOMETRA, OSNOVANNOGO NA EFFEKTE PEL'T'YE),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 02G.
W74-02303

AN AIRBORNE GAMMA SURVEY OF MOISTURE CONTENT IN THE SURFACE DETENTION LAYER, (SAMOLETNAYA GAMMA-S'YEMKA ZAPASOV VLAGI V SLOYE POVERKHNOSTNOGO ZADERZHANIYA),
Institut Prikladnoi Geofiziki, Moscow (USSR).
For primary bibliographic entry see Field 02G.
W74-02307

SAMPLING TECHNIQUES IN CHROMATOGRAPHY,
Waterloo Univ. (Ontario). Dept. of Chemistry.
F. W. Karasek.
Research Development, Vol 24, No 9, p 54-57, September 1973. 4 fig, 15 ref.

Descriptors: *Gas chromatography, *Sampling, Mechanical equipment, Instrumentation, Valves.
Identifiers: *Sample injection, Syringes, Liquid chromatography.

Methods and problems associated with sample introduction in gas chromatography are discussed. The most widely used method employs a syringe to inject the sample through a septum. Reproducibility is plus or minus 1 percent. However, problems such as septum leakage, sample blowback in the syringe, and nonlinear volatilization of sample may destroy the accuracy of results. Valves have also been developed for sample injection. These can perform many thousands of sample injections (versus 50-80 for a septum) and can be used for backflushing, column or sample selection, detector switching, and concentration techniques. Valves also are frequently used in process chromatographs under automatic control and provide reproducibility of better than plus or minus 1 percent. Many of the procedures used with GC are useful for liquid chromatography. (Little-Battelle)
W74-02372

PRINTOUT COLORIMETER FOR AUTOANALYSIS OF WATER POLLUTION,
Upper Tame Main Drainage Authority, Birmingham (England).
For primary bibliographic entry see Field 05A.
W74-02374

A PNEUMATIC SAMPLE CHANGER FOR GAMMA-RAY SPECTROSCOPY,
Geological Survey, Washington, D.C.
C. J. Massoni, R. V. Fones, and F. O. Simon.
Review of Scientific Instruments, Vol 44, No 9, p 1350-1352, September 1973. 2 fig.

Descriptors: *Instrumentation, *Automatic control, Reliability.
Identifiers: *Gamma ray spectroscopy, Sample changers.

The capacity of gamma-ray spectroscopy equipment was increased by the addition of a gravity-fed, pneumatic-ejection sample changer. The changer is designed for solid samples which are placed in polyethylene rabbits 1.65 cm in diam and 5.50 cm long. These are made by cutting off the hinge and opening tab from a 7.4-ml polyethylene vial. Operation of the changer and the associated electronics are described. The electronic circuitry has a fail-safe feature which stops the operation of the changer if a malfunction occurs. The system has proved to be more than 99 percent reliable. (Little-Battelle)
W74-02407

AN IMPROVED BOTTOM-WATER SAMPLER,
University Coll. of Swansea (Wales). Dept. of Geology and Oceanography.
J. R. Joyce.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 3, p 741-744, August 1973. 1 fig, 6 ref.

Descriptors: *Sampling, Mechanical equipment, Water, Design criteria, Sea water, Fabrication, *Water sampling, Bottom sampling.

Identifiers: *Bottom water sampler.

A sampler for collecting water at predetermined points above the sediment-water interface consists of a frame containing six inverted PVC bottles. The bottom of each bottle has a hole drilled in it which is fitted with a simple perspex flap valve. Silico-rubber tubing is attached to the neck of each bottle and passes through a trigger bar which is connected to an actuating weight and two support bars. The tubes pass through holes in the side plating at different (interchangeable) levels to collect samples at predetermined points above the sediment. The sampler can be actuated at any depth. This device has been successfully used in a study of the Tawe estuary, where a bottom layer of high-turbidity, low-salinity water has been discovered. (Little-Battelle)
W74-02410

HIGH PRECISION SAMPLING FOR CHROMATOGRAPHIC SEPARATIONS,
National Bureau of Standards, Washington, D.C. Analytical Chemistry Div.
For primary bibliographic entry see Field 02K.
W74-02414

AN AUTOMATED ANALYSIS FOR UREA IN SEAWATER,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 05A.
W74-02421

AERIAL REMOTE SENSING OF CARBONATE TERRANES IN SHELBY COUNTY, ALABAMA,
Geological Survey, University, Ala.
W. M. Warren, and C. C. Wielchowsky.
Ground Water, Vol 11, No 6, p 14-26, November-December 1973. 8 fig, 17 ref.

Descriptors: *Remote sensing, *Terrain analysis, *Karst, *Alabama, *Land subsidence, Mapping, Surveys, Topography, Geologic mapping, Radar, Aerial photography, Karst hydrology, Structural geology, Hydrogeology.
Identifiers: Shelby County (Ala).

Remotely sensed data are used by the Geological Survey of Alabama in the study of subsidence and collapse problems in several carbonate terranes. Active areas in Shelby County, Alabama, were delineated by on-the-ground inspection and by use of airborne remote sensors. These active terranes present problems to those who presently live in the area as well as to those who will be involved in the future development of this region; therefore, techniques must be found that can be used to predict subsidence and collapse. In a 70-square-mile test area in the county aerial infrared photography, thermography, and side-looking airborne radar (SLAR) imagery can be used for (1) locating, inventorying, and monitoring sinkholes; (2) predicting potential collapses; (3) mapping fracture traces, lineaments, regional geologic structure, and alignment of sinkholes; and (4) assisting general project planning. Time and effort can be saved by using remote-sensing techniques because large areas can be examined in a very short period of time. (Knapp-USGS)
W74-02467

SYSTEM FOR MONITORING CONTAMINANTS IN LIQUIDS,
For primary bibliographic entry see Field 05A.
W74-02493

A NEW AQUATIC INSECT TRAP,
Union Carbide Corp., Tarrytown, N.Y.
A. W. Fast.
Mich Acad. Vol 5, No 1, p 115-124. 1972. Illus.
Identifiers: *Aquatic insects, *Insect traps, Lakes, Midges, Oxygen, Periphyton, Predation.

A submerged insect trap is described and compared with another type of submerged trap. Six variations of the trap are compared. Submerged suspended traps are basically inefficient and should not be used. Submerged bottom traps should be used in deep water. Floating box traps, tent traps and pyramid traps may be used in shallow water. If floating pyramid or bottom traps are used, the contents of the entire trap must be collected. In some weedy areas, a floating trap is the only appropriate kind. Traps should be serviced and moved daily to prevent losses due to decomposition, predation and sinking. Daily servicing will also avoid oxygen depletion and reduced recruitment problems. Clear plastic or screened traps should be used rather than opaque traps. Traps that cut off both light and water circulation lead to oxygen depletion and cessation of emergence. Traps that cut off water circulation appear to lead to reduced recruitment. Traps should be dried out periodically to prevent periphyton growths and midge attachment.--Copyright 1973, Biological Abstracts, Inc.
W74-02551

ERTS-1 IMAGE CONTRIBUTES TO UNDERSTANDING OF GEOLOGIC STRUCTURES RELATED TO MANAGUA EARTHQUAKE, 1972,
Geological Survey, Washington, D.C.
W. D. Carter, and G. P. Eaton.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Administration Rept NASA SP-327, p 459-471, 1973. 8 fig, 1 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Earthquakes, *Structural geology, Surveys, Disasters, Faults (Geologic), Data collections, Hazards.
Identifiers: ERTS, *Managua (Nicaragua).

ERTS-1 imaged the western portion of Nicaragua on December 24, 1972, one day after the central part of the city of Managua was devastated by a major earthquake which measured 5.6 on the Richter scale. ERTS-1 images reveal four sets of lineaments (which may reflect fault systems) among any one of which movement could have taken place. One set, trending N 50 deg W, includes a line of active volcanoes that parallels the coast and constitutes the southwestern edge of the Nicaraguan Depression, a regional graben which cuts obliquely across the Central American isthmus. A parallel lineament, north of Lake Managua, marks the northeast edge of the graben. A less conspicuous set is represented by only three identified members within Nicaragua. Two others, which are subparalle, are visible on the image in the area of Honduras, to the northwest. This set is notable for the fact that it extends from the coast entirely across the Nicaraguan Depression. This set is represented by four currently active, left-lateral, strike-slip faults and a narrow belt of aftershock epicenters. (See also W74-01663 and W74-02562 thru W74-02604) (Knapp-USGS)
W74-02561

RECOGNITION OF SURFACE LITHOLOGIC AND TOPOGRAPHIC PATTERNS IN SOUTHWEST COLORADO WITH ADP TECHNIQUES,
Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
W. N. Melhorn, and S. Sinnock.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 473-481, 1973. 4 fig, 1 tab, 4 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Structural geology, *Terrain analysis, Topography, Surveys, Mapping, Geomorphology, Data collections, Colorado.
Identifiers: ERTS.

Analysis of ERTS-1 multispectral data by automatic pattern recognition procedures is applicable in studies of resource stresses by providing a means for refining existing geologic maps. Machine recognition of extensive surface lithologic and topographic patterns is possible. Automatic mapping of a series of hogbacks, strike valleys, and alluvial surfaces along the northwest flank of the San Juan basin in Colorado was obtained in a test study by man-machine interaction using minimal human input. The determination of causes for separable spectral signatures is dependent upon extensive correlation of field-based ground truth observations and aircraft underflight data with the satellite data. (See also W74-02561) (Knapp-USGS)
W74-02562

ERTS-1 IMAGERY AS AN AID TO THE DEFINITION OF THE GEOTECTONIC DOMAINS OF THE SOUTHERN AFRICAN CRYSTALLINE SHIELD,
Johannesburg Consolidated Investment Co. Ltd., Randfontein (South Africa). Geological Research Dept.
M. J. Viljoen, and R. P. Viljoen.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 483-491, 1973. 6 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Structural geology, *Geologic mapping, Surveys, Mapping, Data collections, Africa, Terrain analysis, Geomorphology.
Identifiers: ERTS, *South Africa.

ERTS data can be used to identify ancient granite-greenstone cratons and the metamorphic mobile belts, the two major geotectonic units of the Southern African Crystalline Shield. Each has its own distinctive structural style. The broad synoptic view provided by ERTS imagery is ideally suited to a study of the diagnostic macrostructures, and the different geotectonic styles are clearly recorded. ERTS-1 imagery thus allows a more accurate definition than exists at present of the contact zones and internal structures of the two domains. (See also W74-02561) (Knapp-USGS)
W74-02563

NEW ASPECTS ON THE TECTONIC OF THE ALPS AND THE APENNINES REVEALED BY ERTS-1 DATA,
Zentralstelle fuer Geo-Photogrammetrie und Fernerkundung, Munich (West Germany).
J. Bodechtel, and B. Lammerer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 493-399, 1973. 7 fig.

Descriptors: *Remote sensing, *Satellite (Artificial), *Geologic mapping, *Structural geology, *Alpine, Mountains, Geomorphology, Terrain analysis, Data collections, Faults (Geologic), Surveys.
Identifiers: ERTS, *Alps.

The Alpine region is one of the most complicated and best investigated parts of the world. Therefore, it is very interesting to compare the ground truth with data revealed by ERTS-1 imagery. Large lineaments shown by ERTS are not influenced by nappe systems or specific rock properties. Therefore, they can be assumed to have been formed during a very late stage of the Alpine orogeny. Their occurrence in pairs and their straight courses give strong evidence for shearing movement. The whole Alpine body has been affected by a compressing force after nappe trans-

port, and the locally detected strike-slip faults are now shown by ERTS to belong to a hugh and extended shearing system. This system is not limited to the Alps, but it extends to the molasse foreland. In this foreland with its weak sediments, faults and fractures are difficult to detect. ERTS-1 imageries show the pattern of lineaments very clearly. These lineaments often end at the Alpine margin or the folded part of the molasse. This folded part of the molasse probably buffered the stress down to the amount in which a shearing system could develop instead of folding or nappe overthrusts. The knowledge of the tectonic evolution and the structural pattern of the molasse may become important for petroleum prospecting. (See also W74-02561) (Knapp-USGS)
W74-02564

STRUCTURAL LINEAMENTS OF GASPE FROM ERTS IMAGERY,
R. Steffensen.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 501-515, 1973. 5 fig, 13 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Structural geology, Canada, Surveys, Data collections, Faults (Geologic), Stratigraphy, Geomorphology.
Identifiers: ERTS, *Gaspe.

A test study was conducted to assess the value of ERTS images for mapping geologic features of the Gaspe Peninsula, Quebec. Of the four spectral bands of the multispectral scanner, the band from 700 to 800 nanometers, which seems to possess the best informational content for geologic study, was selected for analysis. Structural lineaments were outlined and classified according to five categories: morpho-lithologic boundaries, morpho-lithologic lineaments, fault traces, fracture zones and undefined lineaments. Comparison with the geologic map of Gaspe shows that morpho-lithologic boundaries correspond to contacts between regional stratigraphic units. Morpho-lithologic lineaments follow bedding trends, whereas fracture traces appear as sets of parallel lineaments, intersecting at high angles the previous category of lineaments. Fault traces mark more precisely the location of faults already mapped and spot the presence of faults not indicated on the geologic map. As a tool for mineral exploration the structural lineaments map of Gaspe can be used to improve the understanding of the tectonic framework of the Peninsula, to direct exploration efforts over specific target areas, to assist in deciphering the meaning of geophysical survey data, and to support the delineation of trends in the distribution of regional geochemical anomalies. (See also W74-02461) (Knapp-USGS)
W74-02565

LINEAMENTS IN COASTAL PLAIN SEDIMENTS AS SEEN IN ERTS IMAGERY,
Geological Survey, Reston, Va. EROS Program Office.
C. F. Withington.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 517-521, 1973. 1 fig, 1 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Coastal Plains, *Geologic mapping, *Structural geology, Virginia, Maryland, Earthquakes, Data collections.
Identifiers: ERTS.

Examination of satellite imagery over the Atlantic Coastal Plain near Washington, D.C., shows numerous lineaments, which cannot be accounted for by any known cultural or natural features. At least some of these lineaments represent the surface expression of faults, for one of them has been correlated with the outcrop of a fault that had been traced for several miles in southern Prince Georges County, Maryland. If a substantial number of these lineaments do indeed represent fault traces, the fact that they show on the surface suggests that the geologic history of the Coastal Plain is much more complex than has previously been recognized, and that faulting may have occurred in the Holocene, much later than has generally been recognized. The importance that such recent movements could have on future development of the Coastal Plain should emphasized. (See also W74-02561) (Knapp-USGS)
W74-02566

EVALUATION OF COMMERCIAL UTILITY OF ERTS-A IMAGERY IN STRUCTURAL RECONNAISSANCE FOR MINERALS AND PETROLEUM,
Texas Instruments, Inc., Dallas.
D. F. Saunders, and G. E. Thomas.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 523-530, 1973. 8 fig, 17 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Exploration, *Surveys, Geologic mapping, Structural geology, Mining, Oil fields, Data collections, Data processing, Mapping, Terrain analysis.
Identifiers: ERTS.

Five areas in North America (North Slope-Alaska, Superior Province-Canada, Williston basin-Montana, Colorado and New Mexico-West Texas) are being studied for discernibility of geological evidence on ERTS-A imagery. ERTS data are compared with known mineral and hydrocarbon accumultions to determine the value of the imagery in commercial exploration programs. Clearly discernible structural lineaments in New Mexico-West Texas are evident on the photographs. Comparison of this evidence with known major mining localities in New Mexico indicates a clear pattern of coincidence between the lineaments and mining localities. In West Texas, lineament and geomorphological evidence obtainable from the photographs define the petroleum-productive Central Basin Platform. ERTS-A imagery should be extremely valuable in defining the regional and local structure in any commercial exploration program. (See also W74-02561) (Knapp-USGS)
W74-02567

STRUCTURAL INTERPRETATIONS BASED ON ERTS-1 IMAGERY, BIGHORN REGION, WYOMING-MONTANA,
Iowa Univ., Iowa City. Dept. of Geology.
R. A. Hoppins.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 531-538, 1973. 3 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Structural geology, *Geologic mapping, Surveys, Wyoming, Montana, Data collections, Terrain analysis, Geomorphology, Mapping.
Identifiers: *Bighorns (Wyo-Mont), ERTS.

Structural analysis of the Bighorn region of Wyoming and Montana is being carried out on ERTS bands MSS 5 and 7. Geologic structure is primarily revealed in topographic relief and drainage. Topographic linears are particularly well developed in the Bighorn uplift. Many of these occur along known faults and shear zones in the Precambrian core; several have not been previously mapped. These linears, however, do not continue into the younger rocks of the flanks or do so in a much less marked manner than in the core. Linears are far less abundant in the basin or are minifested only in very subtle tonal contrasts and straight drainage segments. Some of the linears are aligned along trends previously postulated on the basis of surface mapping to be lineaments. The imagery reveals little or no evidence of strike-slip displacements along these lineaments. Larger folds show up very well. (See also W74-02561) (Knapp-USGS)
W74-02568

APPLICABILITY OF ERTS-1 TO LINEAMENT AND PHOTOGEOLOGIC MAPPING IN MONTANA--PRELIMINARY REPORT,
Montana Univ., Missoula.
R. M. Weidman, D. D. Alt, R. E. Flood, Jr., K. T. Hawley, and L. K. Wackwitz.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 539-546, 1973. 4 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Structural geology, *Geologic mapping, Surveys, Wyoming, Montana, Data collections, Terrain analysis, Geomorphology, Mapping.
Identifiers: ERTS.

A lineament map prepared from a mosaic of western Montana shows about 85 lines not represented on the state geologic map, including elements of a northeast-trending set through central western Montana which merit ground truth checking and consideration in regional structural analysis. Experimental fold annotation resulted in a significant local correction to the state geologic map. Photogeologic mapping studies produced only limited success in identification of rock types, but they did result in the precise delineation of a late Cretaceous or early Tertiary volcanic field (Adel Mountain field) and the mapping of a connection between two granitic bodies shown on the state map. Imagery was used successfully to map clay pans associated with bentonite beds in gently dipping Bearpaw Shale. ERTS imagery should be used to facilitate preparation of a statewide tectonic map. Satellite imagery mapping, aided by ground calibration, provides an economical means to discover and correct errors in the state geologic map. (See also W74-02561) (Knapp-USGS)
W74-02569

A NEW FAULT LINEAMENT IN SOUTHERN CALIFORNIA,
California Univ., Riverside. Dept. of Geography.
R. W. Pease, and C. W. Johnson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 547-552, 1973. 6 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Structural geology, *Earthquakes, Geologic mapping, Mapping, Faults (Geologic), Data collections, Seismic studies, California.
Identifiers: ERTS.

ERTS-1 imagery clearly shows a 50-mile-wide tectonic zone across Southern California oriented about 15 deg to the structures of the Transverse Ranges or with an azimuth of 70 deg. The zone is delineated on the imagery by terrain alignments and vegetational differences. A previously undisclosed tectonic lineament extends across the Mojave Desert and appears as a line of crustal upwarping. Pressures which would have caused this plus the occurrence of many thrust faults with the 70 deg azimuth indicate this to be a zone of crustal compression. Recent earthquake epicenters appear to be related to this compression zone rather

than the traditional fault network of Southern California. (See also W74-02561) (Knapp-USGS)
W74-02570

FRACTURE MAPPING AND STRIP MINE INVENTORY IN THE MIDWEST BY USING ERTS-1 IMAGERY,
Geological Survey, Bloomington, Ind.
C. W. Wier, F. J. Wobber, O. R. Russell, and R. V. Amato.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 553-560, 1973. 4 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mining, *Structural geology, Strip mines, Indiana, Environmental effects, Land conservation, Hazards, Data collections.
Identifiers: ERTS.

ERTS-1 imagery and high-altitude infrared photography yield useful fracture data in Indiana and Illinois despite a glacial till cover. ERTS MSS bands 5 and 7 are most useful for fracture mapping in coal-bearing rocks in this region. A reasonable correlation can be made between fractures and mine roof-fall accidents. Information related to surface-mined land, such as disturbed area, water bodies, and kind of reclamation, may also be derived from the analysis of ERTS imagery. (See also W74-02561) (Knapp-USGS)
W74-02571

ERTS-1 INVESTIGATION OF ECOLOGICAL EFFECTS OF STRIP MINING IN EASTERN OHIO,
Bendix Corp., Ann Arbor, Mich.
P. E. Chase, and W. Pettyjohn.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 561-568, 1973. 4 fig, 2 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Strip mining, *Mapping, *Environmental effects, Ecology, Surveys, Ohio, Data collections, Data processing.
Identifiers: ERTS.

ERTS data were used to detect, map, and monitor the effects of strip mining. Enlarged ERTS imagery and statistically processed data (outline maps and imagery) of stripped earth and standing water were compared to aerial photos of a strip mine near Coshocton, Ohio. The outline maps and decision imagery may be used to form a disruption map of recently mined and underclaimed earth. (See also W74-02561) (Knapp-USGS)
W74-02572

THE USE OF ERTS-1 MSS DATA FOR MAPPING STRIP MINES AND ACID MINE DRAINAGE IN PENNSYLVANIA,
Pennsylvania State Univ., University Park. Office for Remote Sensing of Earth Resources.
J. S. Alexander, D. Dein, and D. P. Gold.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 569-575, 1973. 2 tab, 10 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Strip mining, *Mapping, *Acid mine water, Pennsylvania, Environmental effects, Land reclamation, Ecology, Surveys, Data collections, Data processing.
Identifiers: ERTS.

Digital processing of ERTS-1 MSS data for areas near the west branch of the Susquehanna River permits identification of stripped areas including ones that are not discernible from visual analysis of ERTS imagery. Underflight data and ground-based observations are used for ground truth. Because of associated diagnostic effects on vegetation, seasonal changes in classification criteria are being documented as repeated, cloud-free ERTS-1 coverage of the same area becomes available. Preliminary results indicate that ERTS data can be used to monitor not only the total extent of stripping in given areas but also the effectiveness of reclamation and pollution abatement procedures. (See also W74-02561) (Knapp-USGS)
W74-02573

MONITORING VEGETATION COVER ON MINE DUMPS WITH ERTS-1 IMAGERY: SOME INITIAL RESULTS,
Spectral Africa (Pty) Ltd., Randfontein (South Africa).
B. Gilbertson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 577-584, 1973. 6 fig, 2 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Mining, *Mine wastes, *Waste dumps, Surveys, Mapping, Vegetation effects, Land reclamation.
Identifiers: *South Africa, ERTS.

ERTS-1 imagery is being used in an attempt to differentiate between mine dumps having varying degrees of vegetative cover. The various dumps can be located and identified, and differences in vegetative cover can be seen and measured. Patterns of vegetative growth, some characteristic to particular dumps, can also be seen. Therefore, mine dumps can be differentiated with respect to their vegetative cover on the imagery received to date. Subsequent imagery showing seasonal variations should facilitate this program. (See also W74-02561) (Knapp-USGS)
W74-02574

REMOTE DETECTION OF AEROSOL POLLUTION BY ERTS,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
G. E. Copeland, A. R. Bandy, E. C. Kindle, R. N. Blais, and G. M. Hilton.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 585-592, 1973. 6 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Air pollution, *Path of pollutants, Surveys, Smoke, Data collections.
Identifiers: ERTS.

ERTS-1 MSS imagery of Eastern Virginia coupled with extensive ground truth air quality and meteorological data may be used for identification and surveying of particulate air-pollution sources (smoke plumes). The quantitative monitoring of smokestacks from orbital altitudes over state size regions appears possible when tied to realistic plume models and minimal ground truth. Data collected over urban areas can possibly be utilized to produce isopleths of particulates when supplemented by local measurements. (See also W74-02561) (Knapp-USGS)
W74-02575

DETECTION, MAPPING AND ESTIMATION OF RATE SPREAD OF GRASS FIRES FROM SOUTHERN AFRICAN ERTS-1 IMAGERY,
Forest Management Inst., Ottawa (Ontario).
J. M. Wightman.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 593-601, 1973. 4 fig, 1 tab.

Descriptors: *Remote sensing, *Satellites (Artificial), *Grasslands, *Burning, Surveys, Monitoring, Mapping, Africa, Data collections.
Identifiers: ERTS.

ERTS band-6 imagery of the Zambesi basin of southern Africa recorded substantial changes in burn patterns resulting from late dry season grass fires. One example from northern Botswana indicates that a fire consumed approximately 70 square miles of grassland over a 24-hour period. Another example from western Zambia indicates increased fire activity over a 19-day period. Other examples clearly define the area of widespread grass fires in Angola, Botswana, Rhodesia and Zambia. From the fire patterns visible on the sequential portions of the imagery, and the time intervals involved, the rates of spread of the fires were estimated and compared with estimates derived from experimental burning plots in Zambia and Canada. Sequential ERTS-1 imagery, of the quality studied, clearly provides the information needed to detect and map grass fires and to monitor their rates of spread in this region during the late dry season. (See also W74-02561) (Knapp-USGS)
W74-02576

MAPPING ATLANTIC COASTAL MARSHLANDS, MARYLAND, GEORGIA, USING ERTS-1 IMAGERY,
American Univ., Washington D.C. Dept. of Biology.
R. R. Anderson, V. Carter, and J. McGinness.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 603-613, 1973. 7 fig, 3 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Wetlands, *Mapping, *Surveys, Monitoring, Marshes, Data collections, Vegetation.
Identifiers: ERTS.

ERTS provides an opportunity to test the feasibility of mapping wetlands using small scale imagery. The test sites selected were in Chesapeake Bay, Maryland, and Ossabaw Island, Georgia. The upper wetland boundary drainage patterns, plant communities, including Spartina alterniflora, Spartina patens, and Juncus roemerianus, ditching activities, and lagooning were identified. ERTS is an excellent tool for many types of coastal wetland mapping. (See also W74-02561) (Knapp-USGS)
W74-02577

IDENTIFICATION OF MARSH VEGETATION AND COASTAL LAND USE IN ERTS-1 IMAGERY,
Delaware Univ., Newark. Coll. of Marine Studies.
V. Klemas, F. Daiber, and D. Bartlett.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 615-627, 1973. 8 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Wetlands, *Mapping, *Surveys, Monitoring, Marshes, Data collections, Vegetation.
Identifiers: ERTS.

Coastal vegetation species appearing in the ERTS-1 images taken on Delaware Bay on August 16 and October 10, 1972, were correlated with ground truth vegetation maps and imagery obtained from high altitude RB-57 and U-2 overflights. Five vegetation communities could be clearly dis-

criminated, including: (1) salt marsh cord grass; (2) salt marsh hay and spike grass; (3) reed grass; (4) high tide bush and sea myrtle; and (5) a group of freshwater species found in impoundments built to attract waterfowl. Spectral discrimination capabilities of ERTS-1 imagery compare favorably with those of aerial infrared photography, and spatial resolution is the dominant factor limiting the potential for detailed vegetation mapping using ERTS-1 imagery. (See also W74-02561) (Knapp-USGS)
W74-02578

APPLICATION OF ERTS-1 DATA TO THE PROTECTION AND MANAGEMENT OF NEW JERSEY'S COASTAL ENVIRONMENT,
Earth Satellite Corp., Washington, D.C. Geosciences and Environmental Applications Div.
R. L. Mairs, F. J. Wobber, D. Garofalo, and R. Yunghans.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 629-634, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Monitoring, *Water pollution, New Jersey, Wetlands, Beaches, Path of pollutants, Water pollution sources, Mapping, Data collections.
Identifiers: ERTS.

ERTS-1 imagery is being used by the New Jersey Department of Environmental Protection to develop information that will assist the state in managing its coastal resources. Initial analyses of imagery from several successive ERTS-1 orbits show the extent, predominant drift, and dispersion characteristics of waste disposal in coastal New Jersey waters. Imagery (MSS bands 4 and 5) for several orbits shows the New York Harbor tidal discharge extending as far south as Long Branch, New Jersey. Increased reflectance of turbid waters shows the effects of a large sewage effluent flow. As these waters are flushed with each tidal change, the turbid waters emanate out to the populous bathing beaches. (See also W74-02561) (Knapp-USGS)
W74-02579

MONITORING OCEAN DUMPING WITH ERTS--1 DATA,
Environmental Research Inst. of Michigan, Ann Arbor.
C. T. Wezernak, and N. Roller.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 635-641, 1973. 2 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Monitoring, *Path of pollutants, Waste disposal, Water pollution sources, Data collections.
Identifiers: *Ocean dumping (Wastes), ERTS.

Large volumes of municipal and industrial wastes are disposed of by means of dumping at sea. Disposal of wastes by barge dumping frequently produces surface films and waste fields whose fate and effects are not adequately defined. Frequently very large areas of the marine environment are affected. ERTS-1 data for the New York Bight were collected on August 16, 1972. Acid-iron wastes, sewage sludge, suspended solids, and major water mass boundary features could be seen in the study area. The surface movement of the wastes and the location of major water mass boundaries may be monitored. Synoptic coverage of the type available from satellite altitudes can be expected to contribute towards an understanding of surface circulation patterns in the area. (See also W74-02561) (Knapp-USGS)
W74-02580

ENVIRONMENTAL STUDY OF ERTS-1 IMAGERY: LAKE CHAMPLAIN AND VERMONT,
Vermont Univ., Burlington.
A. O. Lind, E. B. Henson, and J. Pelton.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 643-650, 1973. 8 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Water pollution, *Land use, Surveys, Investigations, Monitoring, Vermont, Data collections, Lakes, Path of pollutants, Water pollution sources.
Identifiers: *Lake Champlain, ERTS.

Industrial water pollution and turbidity in Lake Champlain were identified and mapped using ERTS data. ERTS imagery also provides a foundation for revising land use inventories which will be necessary for meeting some of the informational needs of the Land Use and Land Capability Act (Act 250). Major classes of land use were identified and mapped, and substantial progress was made toward the mapping of such land use divisions as crop and forest type and wetlands. (See also W74-02561) (Knapp-USGS)
W74-02581

WATER TURBIDITY DETECTION USING ERTS-1 IMAGERY,
Geological Survey, Lawrence, Kans.
H. L. Yarger, J. R. McCauley, G. W. James, L. M. Magnuson, and G. R. Marzolf.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 651-658, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Turbidity, *Reservoirs, Kansas, Monitoring, Water quality, Data collections, Surveys, Great Plains, Water management (Applied), Suspended load.
Identifiers: ERTS.

ERTS-1 images of two federal reservoirs in Kansas exhibit good correlation with suspended load. The major reservoirs in Kansas, as well as in other Great Plains states, are playing increasingly important roles in flood control, recreation, agriculture, and urban water supply. Satellite imagery may prove useful for acquiring timely low cost water quality data required for optimum management of these freshwater resources. (See also W74-02561) (Knapp-USGS)
W74-02582

DIGITAL ANALYSIS OF POTOMAC RIVER BASIN ERTS IMAGERY: SEDIMENTATION LEVELS AT THE POTOMAC-ANACOSTIA CONFLUENCE AND STRIP MINING IN ALLEGHENY COUNTY, MARYLAND,
American Univ., Washington, D.C. Dept. of Biology.
J. S. Schubert, and N. H. MacLeod.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 659-664, 1973. 1 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Data processing, *Potomac River, *Strip mines, Water pollution, Sedimentation, Monitoring, Data collections, Maryland.
Identifiers: ERTS.

Two simple algorithms for classification of sedimentation levels in water and for delineation of active strip mines are used with ERTS data for sedimentation analysis of the Anacostia River, the Potomac River, and mud flats resulting from effluent of a major sewage treatment plant. Mud flats or organic or mineral origin are easily distinguished. Several classes of sedimentation are easily constructed. In imagery of Allegheny County, Maryland, strip mines occur in rural areas where open fields are on the dissected Allegheny plateau, forests are more generally in stream channels below. The mines are cut into the horizontal contour of the valley slopes and are easily distinguished from their surroundings. (See also W74-02561) (Knapp-USGS)
W74-02583

A STUDY ON THE EROSION OF NIIGATA BEACH FROM ERTS-A IMAGERY,
Tokyo Univ. (Japan). Inst. of Industrial Science.
T. Maruyasu.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Report NASA SP-327, p 665-672, 1973. 6 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Beach erosion, Monitoring, Data collections, Surveys, Mapping, Littoral drift.
Identifiers: Niigata Beach (Japan), ERTS.

One of the causes of coastal erosion can be construction works such as flood control dams, short cut channels, or breakwaters, which reduce the transportation of river silt sand. ERTS-A imagery shows the relations between the status of erosion, effluent patterns affected by the coastal current, and cultural construction works. The Niigata alluvial plain, on the Japan Sea, is produced by the Shinano River and the Agano River. The shoreline at the west beach has eroded 360 meters in 60 years since the completion of the breakwater, while the shoreline at the east beach has eroded 300 meters in 40 years since the construction of the Ohkozu short cut channel. (See also W74-02561) (Knapp-USGS)
W74-02584

APPLICATION OF ERTS DATA TO THE DETECTION OF THIN CIRRUS AND CLEAR AIR TURBULENCE,
Japan Meteorological Agency, Tokyo.
K. Tsuchiya, and T. Kamiko.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 673-680, 1973. 7 fig, 2 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Clouds, *Turbulence, *Air circulation, Winds, Weather, Meteorology, Atmospheric physics, Data collections.
Identifiers: *Clear air turbulence, ERTS.

Thin cirrus and clear air turbulence were studied using ERTS MSS data. Thin cirrus not shown in a conventional meteorological satellite picture can be revealed in ERTS MSS pictures. The cores of jet streams can be located with high accuracy from ERTS Pictures, and the possible area of clear air turbulence can be predicted. (See also W74-02561) (Knapp-USGS)
W74-02585

POLLUTED AND TURBID WATER MASSES IN OSAKA BAY AND ITS VICINITY REVEALED WITH ERTS-A IMAGERIES,
Kyoto Gakuen Univ. (Japan).
K. Watanabe.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 681-687, 1973. 4 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Monitoring, *Water pollution, *Surveys, Path of pollutants, Bays, Data collections, Currents (Water).
Identifiers: *Osaka Bay (Japan), ERTS.

Water pollution is one of the most serious problems in Osaka Bay, Japan, and its vicinity. However, the state of water pollution there has never been monitored because conventional point-to-point observations do not detect periodical movement of water masses with a fairly strong tidal current. ERTS-A provides very valuable MSS imagery of Osaka Bay and its vicinity. In the MSS-4 and MSS-5 imageries a complex pattern of water masses can be seen. Some patterns are easily identified from their shapes as cloud covers or polluted water masses. A simple method distinguishes water masses from cloud cover and from noise caused by sunlight reflected from wave surfaces. The polluted water does not diffuse continuously into the oceanic water but forms masses. A front between an oceanic water mass and a polluted water mass runs NW-SE in the center of Osaka Bay. (See also W74-02561) (Knapp-USGS)
W74-02586

RED TIDE IN ISE BAY,
Toba Merchant Marine Coll. (Japan).
H. Ochiai.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 689-693, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Red tide, *Surveys, Monitoring, Data collections, Water pollution, Turbidity.
Identifiers: *Ise Bay (Japan), ERTS.

From October 5 to October 26, 1972, the northwestern part of Ise Bay was seriously affected by red tide. The boundary of red tide was mapped using several imageries produced from ERTS-1 data. The green band with 0.50-0.60 wavelength detects clear water. The transparency distribution of Ise Bay shows that the area along the western coast near Yokkaichi was in poor condition, while the green band imagery shows two patterns extended to the northeast and southeast like belts; these are the areas of red tide. (See also W74-02561) (Knapp-USGS)
W74-02587

HYDROGEOLOGY OF CLOSED BASINS AND DESERTS OF SOUTH AMERICA, ERTS-1 INTERPRETATIONS,
Geological Survey, Washington, D.C.
G. E. Stoertz, and W. D. Carter.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 695-705, 1973. 4 fig, 2 tab, 2 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Water resources, Deserts, Snowpacks, Playas, Watersheds (Divides), Watersheds (Basins), Hydrogeology, Topography, Floods, Structural geology, Geologic mapping, Runoff forecasting, Geomorphology, South America, Data collections.
Identifiers: ERTS, Chile, Bolivia, Argentina, Peru.

Images from Earth Resources Technology Satellite (ERTS-1) contain data useful in studies of hydrogeology, geomorphology, and paleoclimatology. Deserts and semidesert areas in southwestern Bolivia, northwestern Argentina, northern Chile, and southeastern Peru were studied using data taken from July 30 to November 17, 1972. Hydrologic applications of ERTS imagery include (1) mapping of salars or salt-encrusted playas, which represent water discharges from closed drainage basins; (2) mapping of drainage divides, particularly around closed basins in dry regions; (3) mapping of geologic structural data; (4) revision of geologic maps to show hydrologically important differences in surficial deposits; (5) revision of hydrologic features on topographic maps; (6) monitoring seasonal changes in floodwaters to evaluate areal and seasonal changes in weather, climate, and water resources; (7) mapping of mountain snowpacks; and (8) relation of permanent drainage basin characteristics to seasonal snow cover and floodwater as an aid in estimating water resources of basins lacking meteorological or stream-gaging stations. (See also W74-02561) (Knapp-USGS)
W74-02588

DETECTION OF MAJOR RIVER BED CHANGES IN THE RIVER EBRO (NORTH-EASTERN SPAIN),
R. Espejo, J. Torrent, and C. Roquero.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 707-711, 1973. 3 fig, 1 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Meanders, *Alluvial channels, *Monitoring, Stream erosion, Sedimentation, Flood plains, Data collections.
Identifiers: ERTS, Ebro River (Spain).

The River Ebro is the most important water course in Spain. Major river bed changes were studied over a distance of 30 km either side of the city of Zaragoza using ERTS data. Image quality was good enough to permit a clear identification of the river course, and bands MSS 5 and 7 proved to be the most useful for this purpose. Repetitive coverage by means of satellites can help monitor river changes. ERTS-1 imagery also serves as a source for the detection and selection of areas of newly deposited alluvial materials. (See also W74-02561) (Knapp-USGS)
W74-02589

APPLICATIONS OF MULTISPECTRAL IMAGERY TO WATER RESOURCES DEVELOPMENT PLANNING IN THE LOWER MEKONG BASIN (KHEMER REPUBLIC, LAOS, THAILAND AND VIET-NAM),
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
W. J. van Liere.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A: National Aeronautics and Space Admin Rept NASA SP-327, p 713-741, 1973. 6 fig, 10 photos.

Descriptors: *Remote sensing, *Satellites (Artificial), *Water resources development, Planning, Deltas, Sedimentation, Floods, Drainage, Data collections, Soil surveys, Surveys, Monitoring.
Identifiers: ERTS, *Mekong Delta.

ERTS imagery is used for water resources planning in the lower Mekong basin. It complements data from areas which have been inaccessible in the past. It refines ground surveys, mainly of land forms and soils of existing and planned irrigation projects. It provides new information, which would be almost or entirely impossible to detect with ground surveys or conventional photography; this includes the mechanism of flooding and drainage of the delta, siltation of the Great Lake, acidity and salinity in the lower delta, and fisheries in the estuarine areas. The satellite data are particularly valuable also because their repetitive coverage gives an insight in the gradual transformation of changing features such as the extent of flooding and moisture retention in various soil types. (See also W74-02561) (Knapp-USGS)
W74-02590

APPLICATION OF ERTS-1 IMAGERY TO FLOOD INUNDATION MAPPING,
Iowa State Geological Survey, Iowa City. Remote Sensing Lab.
G. R. Hallberg, B. E. Hoyer, and A. Rango.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 745-753, 1973. 3 fig, 3 tab, 3 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Floods, *Mapping, Monitoring, Data collections, Iowa, Flood data, Flood plains.
Identifiers: ERTS, *Flood mapping, Nishnabotna River (Iowa).

In September, 1972, heavy rains initiated major flooding in southwestern Iowa, concentrated in the East and West Nishnabotna basins. Ground data and a variety of low-altitude multispectral imagery were acquired for the East Nishnabotna River on September 14-15. This successful effort showed that a near-visible infrared sensor could map inundated areas in late summer for at least three days after flood recession. ERTS-1 imagery of the area was obtained on September 18-19. Analysis of MSS imagery reinforced the conclusions of the low-altitude study while increasing the time period critical for imagery acquisition to at least seven days following flood recession. The capability of satellite imagery to map late summer flooding at a scale of 1:250,000 is exhibited by the agreement of interpreted flood boundaries obtained from ERTS-1 imagery to boundaries mapped by low-altitude imagery and ground methods. The synoptic coverage of ERTS-1 allowed extension of the flood mapping to the West Nishnabotna River. Satellite imagery allows rapid appraisal of the areal extent of flood inumdation for entire river systems. (Knapp-USGS)
W74-02591

ASSESSMENT OF FLOOD DAMAGE IN ARIZONA BY MEANS OF ERTS-1 IMAGERY,
Geological Survey, Denver, Colo.
R. B. Morrison, and M. E. Cooley.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 755-760, 1973, 6 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Floods, Arizona, Surveys, Mapping, Damages, Sedimentation, Monitoring, Flash floods, Data collections.
Identifiers: ERTS, *Flood mapping.

ERTS-1 MSS images clearly show two important effects of a large flood in southeastern Arizona--the extent of inundation and the areas affected by severe sediment deposition and erosion--although the images were made a week and a half after the flood. On October 20 and 21, 1972, the upper Gila River had its third largest flood on record. The first ERTS-1 images after the flood were made on November 1 and 2. The inundated area is best displayed on the infrared bands, particularly on band 7, where it appears as a belt along the river that is distinctly darker than adjoining parts of the flood plain. This dark belt does not appear on ERTS images that predate the flood. Presumably the low infrared reflectance of this belt is caused by still-moist soil and by flood-stressed vegetation. Inundation limits mapped from ERTS imagery agree well with those obtained by aerial photography during the flood and by ground surveys. Areas of severe sand and gravel deposition show best on band 5. By comparing before and after flood images in this band, a quick assessment can be made of the severely flood-ravaged land. ((See also W74-02561) Knapp-USGS)
W74-02592

USE OF THE SRI ELECTRONIC SATELLITE IMAGE ANALYSIS CONSOLE FOR MAPPING SOUTHERN ARIZONA PLANT COMMUNITIES FROM ERTS-1 IMAGERY,
Geological Survey, Tucson, Ariz.
R. M. Turner.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 761-768, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Vegetation, *Mapping, Arizona, Ecology, Data collections, Biological communities, Plant populations.
Identifiers: ERTS, *Plant community mapping.

Cloud-free imagery covering the Tucson, Ariz., region for the period from August 22 to November 2, 1972, was used to determine the utility of ERTS-1 data for discriminating boundaries between plant communities. Color composites from MSS-5 and MSS-6 bands were recorded photographically. The color photographs were then used to compare with short-term changes in vegetative cover observed on the ground. Microdensitometric traces were made along selected traverses to quantify changes in scene irradiance across the image field. MSS-6 minus MSS-5 densitometry values were employed as a relative measure of plant cover in the wide range of vegetative zones covered by the traverses. (SEE also W74-02561) (Knapp-USGS)
W74-02593

MONITORING OF STREAMFLOW IN THE VERDE RIVER BY ERTS-1 DATA COLLECTION SYSTEM (DCS),
Geological Survey, Phoenix, Ariz. Water Resources Div.
H. H. Schumann.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 769-776, 1973. 3 fig.

Descriptors: *Remote sensing, *Telemetry, *Satellites (Artificial), *Stream gages, Gaging stations, Arizona, Streamflow, Water levels, Data collections, Data processing.
Identifiers: ERTS, *Verde River (Ariz).

The U.S. Geological Survey in cooperation with the Salt River Valley Water Users Association installed a specially designed gaging station on the Verde River near the town of Camp Verde to evaluate near-real time streamflow data furnished by ERTS-1. The installation is equipped with a Stevens digital water-level recorder, modified for telemetry, and an ERTS-1 data collection platform operating in the digital-parallel mode. During the 43-day period between November 3 and December 15, 1972, the DCS relayed 552 transmissions during 193 data passes. The DCS system transmitted stream-stage information 4.5 times per day on the average. The amount of data received far exceeded the expected single high quality transmission rate of once per 12-hour period from the DCS system. Data are sufficient to accurately compute daily mean gage heights. These, in turn, are used to compute the average daily streamflow rates during stable or slowly changing flow conditions. The digital-parallel DCS data have also furnished useful information during peak-flow periods. (See also W74-02561) (Knapp-USGS)
W74-02594

PRELIMINARY ANALYSIS OF ERTS--RELAYED WATER-RESOURCES DATA IN THE DELAWARE RIVER BASIN,
Geological Survey, Harrisburg, Pa.
R. W. Paulson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 777-792, 1973. 7 fig.

Descriptors: *Remote sensing, *Telemetry, *Satellites (Artificial), *Stream gages, *Observation wells, Water quality, Pennsylvania, Data collections, Hydrologic data, Data processing, Delaware River.
Identifiers: ERTS.

In the Delaware River basin, the ERTS data collection system is performing well. Data collection platforms have been successfully interfaced with five stream-gaging stations and three groundwater observation wells and are being interfaced with 12 water-quality monitors in the basin. Data are being relayed during four or five ERTS orbital passes per day, which is within the design specifications of the ERTS-DCS. (See also W74-02561) (Knapp-USGS)
W74-02595

AN EVALUATION OF SPACE ACQUIRED DATA AS A TOOL FOR MANAGEMENT OF WILDLIFE HABITAT IN ALASKA,
Bureau of Sport Fisheries and Wildlife, Washington, D.C.
B. J. Van Tries.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 795-799, 1973.

Descriptors: *Remote sensing, *Satellites (Artificial), *Ducks (Wild), *Aquatic habitats, Marshes, Ponds, Lakes, Wetlands, Alaska, Wildlife habitats, Data collections, Data processing, Surveys, Monitoring.
Identifiers: ERTS.

ERTS-1 data collection techniques were tested for predictions of waterfowl populations in the fall migration in Alaska. Baseline data which are essential to the State in many aspects of their land use planning functions are also provided. The quantity, quality, and distribution of waterfowl breeding habitat are assessed through frequent ERTS measurements of hydrologic, phenological and vegetational parameters. Basic mapping of vegetation and terrain are possible in certain remote areas of the State for which little or no biological data now exist. The Bureau of Sport Fisheries and Wildlife ERTS-1 experiment on waterfowl habitat is based on the accepted theory that a reliable correlation exists between the 'degree of wetness' (number of ponds and wetlands) existing in July and annual production of birds. (See also W74-02561) (Knapp-USGS)
W74-02596

PRELIMINARY EVALUATION OF ERTS-1 FOR DETERMINING NUMBERS AND DISTRIBUTION OF PRAIRIE PONDS AND LAKES,
Environmental Research Inst. of Michigan, Ann Arbor.
E. A. Work, Jr., D. S. Gilmer, and A. T. Klett.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 801-808, 1973. 5 fig, 6 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Ponds, *Grasslands, Lakes, North Dakota, Mapping, Surveys, Data collections, Data processing, Ducks (Wild), Wildlife habitats, Wetlands.
Identifiers: ERTS.

ERTS-1 and aircraft multispactral data collected over a North Dakota test site during July, 1972, were compared to evaluate the capability of the satellite sensors to detect numbers and sitribution of prairie ponds and lakes. Surface water areas larger than two acreas may be recognized. The proportion estimation technique improves the accuracy of area determination and small pond detection. (See also W74-02561) (Knapp-USGS)
W74-02597

DYNAMICS OF PLAYA LAKES IN THE TEXAS HIGH PLAINS,
Texas Tech Univ., Lubbock. Dept. of Geosciences.
C. C. Reeves, Jr.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 809-817, 1973. 6 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Playas, *Lakes, Great Plains, Surveys, Mapping, Wetlands, Water balance, Data collections, Ecology.
Identifiers: ERTS, *High Plains (Tex).

Satellite imagery can be used for a census of the lake basins which commonly exist in semiarid areas and which sporadically contain water at various times of the year. Storm paths and runoff collected by such lake basins can also be closely monitored, the accuracy dependent on periodicity of the orbits and the size of the basins. Study of the relationships between spectral differences (obtained from ERTS-1 imagery) and the water balance ecosystem of these lake basins in the High Plains of Texas is in a preliminary stage. ERTS-1 MSS band 4 has the poorest tonal contrast in semiarid West Texas, band 5 is best of definition of vegetation, band 6 is best for defining large water areas, and band 7 is best for counting small lake basins with water. Ground truth studies reveal significant differences between the test sites, the relative importance of which is reflected by the hydrologic balance of each lake basin. (See also W74-02561) (Knapp-USGS)
W74-02598

STUDIES IN THE LAKE ONTARIO BASIN USING ERTS-1 AND HIGH ALTITUDE DATA,
Guelph Univ. (Ontario).
A. Falconer, S. H. Collins, W. T. Dickison, R. Protz, and R. P. Bukata.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 819-828, 1973. 4 fig, 15 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Lake Ontario, Surveys, Mapping, Land use, Geomorphology, Sedimentation, Water circulation, Soil moisture, Monitoring, Data processing, Data collections, Hydrologic data, Great Lakes region, Water balance, Planning, Water management (Applied).
Identifiers: ERTS, *Lake Ontario basin.

ERTS studies in the Lake Ontario basin are designed to provide input for models of river basin discharge and macroscale features of lake circulation. High altitude imagery is needed to record the dynamic features of Lake Ontario so that ERTS-1 data may be interpreted. Soil moisture, land use, soils, sediments, and geomorphology data are available on a regional scale from ERTS-1 products. (See also W74-02561) (Knapp-USGS)
W74-02599

PROGRESS OF AN ERTS-1 PROGRAM FOR LAKE ONTARIO AND ITS BASIN,
Environmental Research Inst. of Michigan, Ann Arbor.
T. W. Wagner, and F. C. Polcyn.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National

Aeronautics and Space Admin Rept NASA SP-327, p 829-836, 1973. 5 fig, 5 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Lake Ontario, Surveys, Mapping, Land use, Geomorphology, Sedimentation, Water circulation, Soil moisture, Monitoring, Data processing, Data collections, Hydrologic data, Great Lakes region, Water balance, Planning, Water management (Applied).
Identifiers: ERTS, *Lake Ontario basin.

The Lake Ontario drainage basin covers over 32,000 square miles of U.S. and Canadian territory. ERTS-1 data are contributing to the comprehensive study of this basin as part of the International Field Year for the Great Lakes (IFYGL). The processing approach used for obtaining detailed and objective synoptic information applicable to terrestrial water balance studies of such a large area is discussed. A simple ratio algorithm was tested for minimizing daily variations in ERTS data and for allowing the discrimination of surface features and land use classes of hydrologic significance. These steps are necessary if ERTS data are to provide the quantitative information required for the study and management of areas of regional size. (See also W74-02561) (Knapp-USGS)
W74-02600

REMOTE SENSING OF TURBIDITY PLUMES IN LAKE ONTARIO,
Geological Survey, Arlington, Va.
E. J. Pluhowski.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 837-846, 1973. 8 fig, 4 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Lake Ontario, *Turbidity, Surveys, Path of pollutants, Water circulation, Mapping, Monitoring, Data collections, Currents (Water).
Identifiers: ERTS, Genesee River, Welland Canal, Oswego River.

Preliminary analyses of ERTS-1 imagery demonstrates the utility of the satellite to monitor turbidity plumes generated by the Welland Canal, and the Genesee and Oswego Rivers. Although visible in high altitude photographs, the Niagara River plume is not readily identifiable from satellite imagery. (See also W74-02561) (Knapp-USGS)
W74-02601

ERTS-1 VIEWS THE GREAT LAKES,
Wisconsin Univ., Milwaukee. Air Pollution Analysis Lab.
V. A. Lyons, and S. R. Pease.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 847-854, 1973. 5 fig.

Descriptors: *Remote sensing, *Satellites (Artificial), *Great Lakes region, *Air pollution effects, Meteorology, Data collections, Air pollution, Clouds, Precipitation (Atmospheric), Snow, Weather.
Identifiers: ERTS.

The meteorological content of ERTS images, particularly mesoscale effects of the Great Lakes and air pollution dispersion, is summarized. Summertime lake breeze frontal clouds and various winter lake-effect convection patterns and snow squalls are revealed in great detail. A clear-cut spiral vortex over southern Lake Michigan is related to an early snowstrom in the Chicago area. Marked cloud changes induced by orographic and frictional effects on Lake Michigan's lee shore snow squalls may be seen. The most important finding, however, is a clear-cut example of alterations in cumulus convection by anthropogenic condensation nuclei from steel mills during a snow squall situation. Jet aircraft condensation trails are also found frequently. (See also W74-02561) (Knapp-USGS)
W74-02602

USE OF ERTS DATA FOR MAPPING SNOW COVER IN THE WESTERN UNITED STATES,
Environmental Research and Technology, Inc., Lexington, Mass.
J. C. Barnes, and C. J. Bowley.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 855-862, 1973. 7 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Snow cover, *Snow surveys, Mapping, Runoff forecasting, Monitoring, Terrain analysis, Mountains.
Identifiers: ERTS.

ERTS data are evaluated for mapping snow cover, primarily in the mountainous areas of the western United States. The specific objectives are to determine the spectral interval most suitable for snow detection, to determine the accuracy with which snow lines can be mapped in comparison with the accuracies attainable from other types of measurements, and to develop techniques to differentiate reliably between snow and clouds, and to understand the effects of terrain and forest cover on snow detection. The MSS-5 spectral band is the most useful for detecting and mapping mountain snow cover. Snow cover can be readily detected and can be distinguished from clouds. In addition to various natural features, manmade features such as roads, electric powerlines, cultivated fields, and timber cuts are visible. Several glaciers along the coasts of Greenland exhibit a uniform reflectance in the MSS-4 band, whereas in the MSS-7 band the lower elevation parts appear much darker than the higher elevations. This difference in reflectance is believed to be due to the existence of melt water on the surface of the lower parts of the glaciers as opposed to snow cover on the upper parts. (See also W74-02561) (Knapp-USGS)
W74-02603

EVALUATION OF ERTS IMAGERY FOR MAPPING AND DETECTION OF CHANGES OF SNOWCOVER ON LAND AND ON GLACIERS,
Geological Survey, Tacoma, Wash.
M. F. Meier.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol 1--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NSAS SP-327, p 863-875, 1973. 6 fig, 9 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Snow cover, *Snowpacks, *Glaciers, Surveys, Snow surveys, Runoff forecasting, Data collections, Mapping, Glaciation, Mountains.
Identifiers: ERTS.

The snow cover area on drainage basins was measured from ERTS imagery by video density slicing with a repeatability of 4%. Data from ERTS images of the melt season snow cover in the Thunder Creek drainage basin in the North Cascades were combined with existing hydrologic and meteorologic observations to enable calculation of the time distribution of the water stored in this mountain snowpack. Similar data could be used for frequent updating of expected inflow to reservoirs. Equivalent snowline altitudes were determined from area measurements. Snowline altitudes were also determined by combining enlarged ERTS images with maps with an accuracy of about 60 m under favorable conditions. Ability to map snow cover or to determine snowline altitude depends primarily on cloud cover and vegetation and secondarily on slope, terrain roughness, sun angle, radiometric fidelity, and amount of spectral information available. ERTS imagery was also used to measure glacier accumulation area, detect subtle flow structures on glaciers, identify surgin glaciers, and monitor changes in tidal glacier termini. (See also W74-02561) (Knapp-USGS)
W74-02604

USE OF ERTS-1 IN COASTAL STUDIES,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-02633

DESIGN CONSIDERATIONS FOR A 3-D LASER DOPPLER VELOCIMETER FOR STUDYING GRAVITY WAVES IN SHALLOW WATER,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-02642

AN ANNOTATED BIBLIOGRAPHY OF AERIAL REMOTE SENSING IN COASTAL ENGINEERING,
Clemson Univ., S.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W74-02646

7C. Evaluation, Processing and Publication

SYSTEM 21, 'JUPITER' (A DESIGN SYSTEM FOR TWO-DIMENSIONAL NEARLY-HORIZONTAL FLOWS),
Danish Hydraulic Inst., Copenhagen. Computational Hydraulics Center.
M. B. Abbott, A. Damsgaard, and G. S. Rodenhuis.
Journal of Hydraulic Research, Vol. 11, No 1, p 1-28, 1973. 7 fig, 26 ref.

Descriptors: *Computer programs, *Currents (Water), *Mathematical models, *Numerical analysis, Ocean currents, Winds, Ocean circulation, Beaches, Shores, Waves (Water).

An ensemble of mutually compatible routines for 2-dimensional flows organized into a single software entity can be installed on any large digital computer and used in a routine, repetitive way without any knowledge of its internal operation. Through such a system, advanced techniques of numerical analysis, programming and hardware can be made available to scientific and engineer users in a simple, cheap and reliable way. The system is capable of constructing a model of any region of two-dimensional nearly-horizontal flow, when presented only with the topography of the region, and of operating this model from given initial and boundary conditions, wind velocities, tidal-tractive forces, latitude, and other external conditions if required. It can provide a variety of output organizations: velocity plots and isoline plots for selected regions or the complete computational fields, as well as time variations of principal variables at selected points. (Knapp-USGS)
W74-02159

INPUT SPECIFICATIONS TO STOCHASTIC DECISION MODELS,
Arizona Univ., Tucson. Dept. of Systems Engineering.
For primary bibliographic entry see Field 02E.
W74-02209

OPTIMIZATION OF INDUSTRIAL SYSTEMS WITH THE SEPARABLE PROGRAMMING AND THE GENERALIZED REDUCED GRADIENT METHODS,
Kansas State Univ., Manhattan. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 05G.
W74-02213

DEVELOPMENT OF AN 'OPERATIONS' MODEL FOR MONTANA'S WATER RESOURCES: MIDDLE CREEK RESERVOIR OPERATION,
Montana State Univ., Bozeman. Water Resources Research Center.
For primary bibliographic entry see Field 04A.
W74-02214

FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA,
Montana Univ., Missoula.
For primary bibliographic entry see Field 04A.
W74-02215

PSYCHROMETRIC DATA PATTERNS AND PREDICTION MODELS,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 02B.
W74-02220

CILIATED PROTOZOA. AN ILLUSTRATED GUIDE TO THE SPECIES USED AS BIOLOGICAL INDICATORS IN FRESHWATER BIOLOGY,
For primary bibliographic entry see Field 02I.
W74-02236

MAPPING AVERAGE ANNUAL SURFACE WATER RESOURCES OF THE HYDROLOGICAL REGIONS OF NELSON, NEW ZEALAND,
Ministry of Works, Nelson (New Zealand). Water and Soil Div.
For primary bibliographic entry see Field 02E.
W74-02290

COMPUTER SIMULATION OF STORM WATER RUNOFF,
Northwestern Univ., Evanston, Ill. Technological Inst.
For primary bibliographic entry see Field 02E.
W74-02310

DAM-BREAK FLOOD IN A PRISMATIC DRY CHANNEL,
California Univ., Davis. Dept. of Engineering.
For primary bibliographic entry see Field 08B.
W74-02311

SATURATED-UNSATURATED SEEPAGE BY FINITE ELEMENTS,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Soil and Water.
For primary bibliographic entry see Field 02G.
W74-02313

A GUIDE TO IMPORTANT CHARACTERISTICS AND VALUES OF FRESHWATER WETLANDS IN THE NORTHEAST.
Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
For primary bibliographic entry see Field 04B.
W74-02324

GENERAL SOILS STUDY: PEARL RIVER, HANCOCK, HARRISON COUNTIES, MISSISSIPPI.
Soil Conservation Service, Gulfport, Miss.
For primary bibliographic entry see Field 02G.
W74-02333

APPLICATION AND CONSEQUENCES OF PRECIPITATION OBSERVATIONS IN THE REPUBLIC OF SUDAN IN VIEW OF THE NOMADIC LIFE AND ECONOMY,
Southern Oregon Coll., Ashland. Dept. of Geography.
For primary bibliographic entry see Field 02B.
W74-02348

EVALUATION OF SOIL MOISTURE REGIME IN A WATERSHED,
New Brunswick Univ., Fredericton.
For primary bibliographic entry see Field 02G.
W74-02355

USE OF DIGITAL COMPUTER TECHNIQUES IN WATER RESOURCES DATA STORAGE,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 04B.
W74-02357

INTERPRETATION OF INFRARED SPECTA USING PATTERN RECOGNITION TECHNIQUES,
Pennsylvania State Univ., University Park. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-02376

HYMO: PROBLEM-ORIENTED COMPUTER LANGUAGE FOR HYDROLOGIC MODELING--USERS MANUAL,
Agricultural Research Service, Riesel, Tex.
For primary bibliographic entry see Field 02A.
W74-02469

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR URBAN STUDIES IN THE HOUSTON, TEXAS METROPOLITAN AREA, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 02E.
W74-02471

CALIFORNIA HIGH WATER, 1970-1971,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
For primary bibliographic entry see Field 02E.
W74-02474

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR LITTLE ELM CREEK, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 02E.
W74-02477

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR CALAVERAS AND ESCONDIDO CREEKS, SAN ANTONIO RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex. Water Resources Div.
For primary bibliographic entry see Field 02E.
W74-02478

FLOOD OF JUNE 1972 AT CORNING, NEW YORK,
Geological Survey, Washington, D.C.
K. I. Darmer, and L. A. Wagner.
For sale by USGS, Washington, D.C. 20242, Price $0.75.

Descriptors: *Floods, *Flood data, *Historic floods, *New York, Hydrologic data, Flood damage, Streamflow, Runoff, Flow rates, Peak discharge, Flood profiles, Rainfall, Gaging stations, Flood frequency, Maps, Photography.
Identifiers: *Corning (N.Y.).

This one-sheet atlas describes the greatest flood disaster in the history of New York which occurred during late June 1972 as a result of torrential rains brought by the remnants of Tropical Storm Agnes. The city of Corning, in southwest-central New York, was subjected to the full fury of the flood as crests from the Tioga, Canisteo, and Cohocton Rivers moved into the Chemung River at Corning. Heavy loss of life and property was sustained in the city of Corning and in nearby communities of Gang Mills, Painted Post, Riverside, and South Corning. Maps, graphs, tables and photographs show: bihourly (every 2 hours) precipitation at Hornell, New York, June 20-23, 1972; peak stages and discharges, Chemung River basin, June 23, 1972; peak flood stages above agage height 18.0 feet, Chemung River at Corning, New York, 1865-1972; floodflows entering Chemung River at Corning, June 23, 1972; flood-frequency, Chemung River basin, New York; profiles of floods on Cohocton, Tioga and Chemung Rivers; and flooding in vicinity of Warren and East William Streets in Corning, June 1972. (Woodard-USGS)
W74-02479

HYDROLOGY AND WATER RESOURCES OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Washington, D.C.
R. A. Brackley, W. B. Fleck, and W. R. Meyer.
For sale by USGS, Washington, D.C., 20244, Price $1.00 per set. Hydrologic Investigations Atlas HA-484, 3 sheets, 1973. 5 map, 1 tab, 25 ref.

Descriptors: *Water resources development, *Hydrologic data, *Surface waters, *Groundwater resources, *Massachusetts, River basins, Water quality, Water supply, Streamflow, Aquifer characteristics, Water yield, Planning, Flood data, Peak discharge, Low flow, Stream gages, Water analysis, Chemical analysis, Maps, Hydrographs.
Identifiers: *Neponset River basin (Mass.), *Weymouth River basin (Mass.).

This 3-sheet atlas describes the water resources of parts of Massachusetts. The goal of the investigation is to provide information for use in water-resources planning and to aid in the selection of sites for potential water-supply development. The investigation is subdivided into a series of river-basin studies. The regions included in this report are those parts of the Neponset, Weymouth Fore, and Weymouth Back River basins that are upstream from the tide-affected or heavily-urbanized areas of their lower basins. These streams drain the area south of Boston and flow in a northerly direction to Boston Harbor. The study area encompasses 135 square miles of gently rolling terrain having a local relief of generally 50 to 100 feet. Average precipitation is about 45 inches per year. Of this, about 22 inches is lost through evapotranspiration, about 20 inches is discharged from the area as streamflow, about 2 inches is piped out as sewage or for use outside the area, and the remainder leaves as groundwater underflow. Surface water and groundwater are generally soft to moderately hard and mildly acid. The major quality problems in most streams and in much of the groundwater are concentrations of iron and manganese that exceed the limits recommended for public water supplies by the U.S. Public Health Service. (Woodard-USGS)
W74-02480

STATISTICAL ANALYSIS OF NORTH CAROLINA PRECIPITATION DATA,
North Carolina State Univ., Raleigh. Dept. of Geosciences.
For primary bibliographic entry see Field 02B.
W74-02632

08. ENGINEERING WORKS

8A. Structures

A SUMMARY ANALYSIS OF NINETEEN TESTS OF PROPOSED EVALUATION PROCEDURES ON SELECTED WATER AND LAND RESOURCE PROJECTS.
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-02188

FLOOD CONTROL FUNDS -- 1970 REPORT TO THE LEGISLATURE.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 06C.
W74-02292

OGUNQUIT SAND DUNE LAND STABILIZATION MEASURE, YORK COUNTY IN MAINE, THRESHOLD TO MAINE RESOURCE CONSERVATION AND DEVELOPMENT PROJECT (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Orono, Maine
For primary bibliographic entry see Field 04A.
W74-02504

AN ANNOTATED BIBLIOGRAPHY OF AERIAL REMOTE SENSING IN COASTAL ENGINEERING,
Clemson Univ., S.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W74-02646

8B. Hydraulics

LONG WAVES IN SHALLOW TRIANGULAR CHANNELS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 02E.
W74-02158

SYSTEM 21, 'JUPITER' (A DESIGN SYSTEM FOR TWO-DIMENSIONAL NEARLY-HORIZONTAL FLOWS),
Danish Hydraulic Inst., Copenhagen. Computational Hydraulics Center.
For primary bibliographic entry see Field 07C.
W74-02159

A NEW OSCILLATING WATER TUNNEL,
Queen's Univ., Kingston (Ontario). Coastal Engineering Research Lab.
For primary bibliographic entry see Field 02J.
W74-02160

THE TURBULENT TEMPERATURE MIXING LAYER,
Queen's Univ., Kingston (Ontario). Dept. of Civil Engineering.
T. E. Watt, and W. D. Baines.
Journal of Hydraulic Research, Vol 11, No 2, p 157-166, 1973. 4 fig, 3 ref.

Descriptors: *Mixing, *Diffusion, *Dispersion, Open channel flow, Water temperature, Heat transfer, Turbulence, Turbulent flow, Uniform flow.

Measurement of temperature distribution, thermal diffusivity and temperature fluctuations were made in a uniform turbulent flow with a step change in temperature. The spread of temperature is described by a constant diffusion coefficient which when related to the local turbulence properties compares well with measurements in the core region of open channel flow. In practice this means that the dispersion of pollutants in the almost constant velocity regions in open channel flows and over short distances in the atmosphere can be predicted from a knowledge of the mean flow. (Knapp-USGS)
W74-02162

HYDROLOGIC EVALUATIONS IN BRIDGE PIER SCOUR DESIGN,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
P. C. Klingeman.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10224, p 2175-2184, December 1973. 4 ref.

Descriptors: *Scour, *Bridges, *Piers, *Channel erosion, *Stream stabilization, Hydraulics, Erosion, Floods, Sediment transport, Channel improvement, Alluvial channels, Streamflow, Aerial photography, Stream gages.

Several hydrologic evaluations are important for the design of bridge piers to protect them against streambed scour: (1) prediction of the local stage versus discharge relation: (2) determination of appropriate design floods, their recurrence intervals, and their stages: (3) selection of suitable streambed reference elevations; (4) assessment of hydrograph influences on channel stability with respect to channel alignment, streambed configuration, and streambed degradation; (5) evaluation of the effects of dams, dredging, and sand-and-gravel operations upon sediment transport near bridge piers; (6) evaluation of the effects of scour protection measures; and (7) anticipation of the magnitude of debris transport during floods as related to river stage and to watershed conditions. Method and difficulties in making these hydrologic evaluations are examined. The techniques considered rely mainly upon the development and analysis of stream-gaging records and the analysis of aerial photographs. (Knapp-USGS)
W74-02309

DAM-BREAK FLOOD IN A PRISMATIC DRY CHANNEL,
California Univ., Davis. Dept. of Engineering.
J. G. Sakkas, and T. Strelkoff.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10233, p 2195-2216, December 1973. 11 fig, 21 ref, 3 append. USACE Contract DACW05-71-C-0103 Calif WRC W-259.

Descriptors: *Flood waves, *Dam failure, *Simulation analysis, Floods, Mathematical models, Unsteady flow, Open channel flow.

A mathematical model is presented for the prediction of the flood wave resulting from the instantaneous break of a dam in a prismatic, dry channel of general parabolic cross section. It consists of the numerical integration of the characteristic equations over the irregular grid formed by the characteristic lines using a predictor-corrector scheme. The solution is advanced towards the wave front by a gradual refinement of the characteristics net for reasons of accuracy and economy. Finally, the solution is extended over a short region to the wave tip, which is characterized by zero depth, using a simplified form of the momentum equation resulting from physical considerations in the wave-tip region. Computed results are compared with experimental and theoretical results obtained by others. Corroboration with experimental results is generally good. The solution can be advanced in time until the negative wave propagating into the still water reaches the upstream end of the reservoir. (Knapp-USGS)
W74-02311

FLOW IN OPEN CHANNELS WITH SMOOTH CURVED BOUNDARIES,
Pahlavi Univ., Shiraz (Iran). Dept. of Engineering.
M. S. Moayeri.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10194, p 2217-2232, December 1973. 9 fig, 13 ref, append.

Descriptors: *Open channel flow, *Free surfaces, *Flow around objects, Equations, Weirs, Spillway crests, Flow profiles, Computer programs, Hydraulics, *Boundary processes.

A method of computing flow in open channels with curved transitions in cross section is illustrated by application to an example, the potential flow over a smooth step in an open channel. A detailed description of the flow is given by a pair of integro-differential equations in the free-surface and solid-boundary elevations, derived from the solution of a boundary-value problem of the Dirichlet type in an infinite strip in the complex potential plane. The use of numerical approximations to both the derivatives and integrals in the integro-differential equations leads to a system of simultaneous nonlinear algebraic equations, and this is then solved by a special method of successive approximation. Solutions are obtained for approach Froude numbers F ± 0.4 and 1.7. The computed output consists of the geometry of the free surface, the flow net within, and velocity components and pressure at any point in the flow. (Knapp-USGS)
W74-02312

ADJUSTMENT OF FRICTION IN HYDRAULIC MODELS OF LAKES,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
For primary bibliographic entry see Field 02H.
W74-02314

BED SCOUR AT END-DUMP CHANNEL CONSTRICTIONS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
B. P. Das.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Paper 10228, p 2273-2291, December 1973. 9 fig, 2 tab, 20 ref, append.

Descriptors: *Scour, *Alluvial channels, *Dams, Hydraulics, Erosion, *Channel erosion, Stream erosion, Rockfill dams.
Identifiers: Flow constrictions.

One method of constricting a channel is by end-dumping loose rockfill from one or both banks. Bed scour occurs around the leading face and downstream of such end-dumped dams built into alluvial channels. Analysis of the problem indicates the Froude number of approach flow, the contraction ratio, and the ratio of the maximum scoured depth to the normal flow depth to be the essential nondimensional variables. The maximum scoured depth is influenced also by the size and density of the bed sediment. On the basis of laboratory studies, the functional relationship was established and design curves are presented to directly determine the maximum scoured depth. The location of deepest scour and rate of scour are discussed. (Knapp-USGS)
W74-02316

8C. Hydraulic Machinery

ANALYSIS OF INTERNAL FLOW CHARACTERISTICS OF A SMOOTH-DISK WATER--BRAKE DYNAMOMETER,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
D. G. Evans.
Available from NTIS, Springfield, Va., 22151 as NASA TN D-7234 Price $3.00 printed copy; $1.45 microfiche. Technical Note D-7234, May 1973. 50 p, 17 fig, 2 tab, 6 ref, 6 append.

Descriptors: *Fluid mechanics, *Dynamometers, *Hydraulic models, *Flow characteristics, *Rotational flow, Turbulence, Viscous flow, Shear stress, Correlation analysis, Methodology, Submergence.
Identifiers: *Water brake, Rotating smooth disk, Dimensional analysis.

The principal of absorbing power with an enclosed partially submerged rotating disk through the turbulent viscous shearing of water is discussed. Reference information is used to develop a flow model of the water brake. A method is then presented that uses vector diagrams to relate the effects of rotational flow, through flow, and secondary flow to power absorption. The method is used to describe the operating characteristics of an example 111-cm (43.7 in) diameter water brake. Correlating performance parameters are developed in a dimensional analysis. (Woodard-USGS)
W74-02475

8D. Soil Mechanics

BED SCOUR AT END-DUMP CHANNEL CONSTRICTIONS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-02316

GENERAL SOILS STUDY: PEARL RIVER, HANCOCK, HARRISON COUNTIES, MISSISSIPPI.
Soil Conservation Service, Gulfport, Miss.
For primary bibliographic entry see Field 02G.
W74-02333

8F. Concrete

EFFECT OF A CEMENT ANTICORROSION COATING ON THE QUALITY OF DRINKING WATER, (IN RUSSIAN),
Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 05B.
W74-02233

8I. Fisheries Engineering

THE QUANTITY AND DIMENSIONS OF MICROORGANISMS IN BOTTOM SEDIMENTS OF FISH-BREEDING PONDS (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
A. F. Antipchuk.
Gidrobiol Zh, Vol 8, No 2, p 63-67, 1972, Illus.
Identifiers: *Bacteria, *Bottom sediments, Breeding, *Microorganisms, Sediments, *Fish breeding ponds.

The relationship between the depth of microorganic sediments and the quantity of microorganisms was studied. As the depth increases, the quantity of microorganisms decreases, but the quantity of spores increases. The volume of rod-like bacteria changed very little with the depth, but the cocci volume increased with the depth.--Copyright 1973, Biological Abstracts, Inc.
W74-02228

THE PROSPECTS OF USING THE RYBINSK WATER STORAGE BASIN FOR FISHERIES, (IN RUSSIAN),
L. K. Il'ina, and N. A. Gordeev.
Vopr Ikhtiol. Vol 12, No 5, p 835-842. 1972. Illus.
Identifiers: *Fisheries, Pollution abatement, *USSR (Rybinsk storage lake), Water pollution.

Measures necessary for stepping up fishing in the Rybinsk storage lake, USSR, include selection of table fish species, improvement of spawning grounds and other ecological conditions, and abatement of water pollution.--Copyright 1973, Biological Abstracts, Inc.
W74-02241

THE HYDROLOGY OF TEN STREAMS IN WESTERN WASHINGTON AS RELATED TO THE PROPAGATION OF SEVERAL PACIFIC SALMON SPECIES,
Geological Survey, Tacoma, Wash.
M. R. Collings, and G. W. Hill.
Available from NTIS, Springfield, Va. 22151, PB-224 066; Price $3.00 printed copy; $1.45 microfiche. Water-Resources Investigations 11-73, 1973. 149 p, 77 fig, 21 tab, 29 ref.

Descriptors: *Fish migration, *Spawning, *Salmon, *Washington, Streamflow, Water quality, Streambeds, Data collections, Hydrology, Channel morphology, Stream fisheries, Evaluation, Environmental effects.
Identifiers: *Salmon spawning.

Basic to all other considerations related to the preservation and enhancement of the Pacific salmon runs in Washington are the quantitative and qualitative aspects of the streams utilized by the fish. First, there must be sufficient quantities of water for salmon propagation. Second, stream-hydraulic conditions of depth and velocity must be favorable for salmon spawning and rearing. Third, water quality must be favorable with regard to temperature, suspended sediment, dissolved oxygen, and the quantity of dissolved minerals. This is the third in a series of reports that discuss the results of investigations to determine preferred spawning and rearing discharges on selected streams in western Washington. Using preferred depth and velocity criterion previously determined by anadromous-fish biologists, 300 sets of measurements of depth, velocity, and discharge were obtained during 10 visits to three study reaches on each of 10 streams. The data were evaluated to determine the preferred spawning and rearing flows for fall chinook, spring chinook, sockeye and coho salmon. Documentation also was made of streambed-gravel sizes, water temperatures, suspended-sediment concentrations, dissolved-oxygen concentrations, and specific conductance. (Woodard-USGS)
W74-02297

SEASONAL VARIATIONS IN THE QUALITATIVE AND QUANTITATIVE COMPOSITION OF YOUNG FISH POPULATIONS IN THE VARVARA RESERVOIR, (IN RUSSIAN),
For primary bibliographic entry see Field 02H.
W74-02560

PUGET SOUND RESIDENT COHO SALMON STUDY,
Washington State Dept. of Fisheries, Olympia.
For primary bibliographic entry see Field 02L.
W74-02639

DEVELOPMENT OF A MATHEMATICAL MODEL TO PREDICT THE OCCURRENCE OF CYNOSCION ARENARIUS IN MISSISSIPPI ESTUARIES,
Mississippi Marine Conservation Commission, Biloxi.
For primary bibliographic entry see Field 02L.
W74-02640

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

CHLORINATION EFFECTS ON ORGANIC CONSTITUENTS IN EFFLUENTS FROM DOMESTIC SANITARY SEWAGE TREATMENT PLANTS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05C.
W74-02416

SELECTED REFERENCES, GROUND-WATER CONTAMINATION, THE UNITED STATES OF AMERICA AND PUERTO RICO.
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 05B.
W74-02482

AN ANNOTATED BIBLIOGRAPHY OF AERIAL REMOTE SENSING IN COASTAL ENGINEERING,
Clemson Univ., S.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W74-02646

10F. Preparation of Reviews

CURRENT STATUS OF THE ENVIRONMENTAL AND HUMAN SAFETY ASPECTS OF NITRILOTRIACETIC ACID (NTA),
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05B.
W74-02394

SUBJECT INDEX

2 4 5-T
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

ABSCISIC ACID
The Action of Abscisic Acid on Ion Uptake and Water Flow in Plant Roots,
W74-02260 3F

ABSORPTION
The Effects of Trace Metals on Ground Water Quality as Influenced by Soils Reflecting Differences in Organic Matter Content and Genetic Conditions,
W74-02211 5B

ABSTRACTS
Evapotranspiration and Watershed Research as Related to Riparian and Phreatophyte Management--An Abstract Bibliography.
W74-02630 2D

ACID DYES
Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

ACID MINE WATER
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

ACRIDIDAE
On the Origin of the Wet-Season Form of Zonocerus variegatus (L.) (Orth., Acrididae) In Southern Nigeria, with Some Biological Notes,
W74-02238 2I

ACTINOMYCETES
Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

ACTIVATED CARBON
Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

ACTIVATED SLUDGE
Mathematical Relationships of BOD Removal in Activated Sludge Process,
W74-02176 5D

In-Pipe Wastewater Cleanup.
W74-02269 5D

Dry Activated Sludge as Fertilizer for Winter Wheat and Corn, (Sukhoi aktivnyi il kak udobrenie dlya posevov ozimi pshenits' i kukuruz'),
W74-02270 5D

ADIPOSE TISSUE
The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

ADMINISTRATION
Tombigbee River Valley Water Management District, Tenth Annual Report.
W74-02332 6B

New Concepts in the Law of the Sea,
W74-02497 6E

Ocean Science and Mutual Assistance: An Uneasy Alliance,
W74-02500 6E

A Bill to Prescribe Procedures so as to make Administration of the National Environmental Policy Act of 1969 More Effective.
W74-02528 6E

ADSORPTION
Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

Adsorption Characteristics of Silber, Lead, Cadmium, Zinc, and Nickel on Borosilicate Glass, Polyethylene, and Polypropylene Container Surfaces,
W74-02412 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

AERATION
Nitrification of BOD-Containing Water,
W74-02485 5D

Sewage Treatment Apparatus,
W74-02489 5D

AERIAL PHOTOGRAPHY
An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

AESTHETICS
A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast.
W74-02324 4B

AGE
Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

AGRICULTURAL CHEMICALS
Agricultural Chemicals in Surface Runoff, Ground Water, and Soil: 1. Endrin,
W74-02152 5B

AGRICULTURE
The Use of Desalted Seawater for Intensive Agricultural Applications, (El Uso de Agua de Mar Desalada Para Intensivas Aplicaciones Agricolas),
W74-02359 3A

AGRO (CLIMATES)
Agroclimatic Areas for Wheat and Bioclimatic Characteristics of its Cultivars in Uruguay, (In Spanish),
W74-02354 3F

AIR CIRCULATION
Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

AIR POLLUTION
Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

AIR POLLUTION EFFECTS
ERTS-1 Views the Great Lakes,
W74-02602 7B

ALABAMA
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

Aerial Remote Sensing of Carbonate Terranes in Shelby County, Alabama,
W74-02467 7B

Soil and Water Conservation Districts.
W74-02537 6E

ALASKA
Effects of Highway Bridge Construction on a Subarctic Stream,
W74-02295 4C

ALFALFA
Grasshoppers and Crickets in the Karshi Steppe, (In Russian),
W74-02239 3F

ALGAE
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

ALGAE ORGANIC MATTER
The Ability of Bacteria to Mineralize Algae Organic Matter, (In Russian),
W74-02252 5B

ALGAL GROWTH
The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

ALGAL GROWTH POTENTIAL
A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

ALIPHATIC 1 3-DIOLS
Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

ALIPHATIC HYDROCARBONS
Chemistry of Marine Natural Products,
W74-02189 5B

ALKYL ETHOXYLATES
Analysis of Alkyl Ethoxylates by NMR,
W74-02408 5A

ALLUVIAL CHANNELS
Damping of Water Waves Over Porous Bed,
W74-02315 2E

Bed Scour at End-Dump Channel Constrictions,
W74-02316 8B

Detection of Major River Bed Changes in the River Ebro (North-Eastern Spain),
W74-02589 7B

ALPINE
New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

ALPS
New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

ALTERNATIVE PLANNING
Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

Proper Time Limitations on Outer Continental Shelf Leases Under The National Environmental Policy Act,
W74-02509 6E

ALTERNATIVE WATER USE
Proper Time Limitations on Outer Continental Shelf Leases Under The National Environmental Policy Act,
W74-02509 6E

ALUM SLUDGE
Water-Treatment-Sludge Filtration Studies,
W74-02440 5D

ALUMINUM SULFATE
Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

AMMONIA (ANHYDROUS)
Anhydrous Ammonia for Field Crops: An Evaluation of Anhydrous Ammonia as a Nitrogen Supply for Cotton, Corn, Rice and Wheat,
W74-02240 3F

AMPEROMETRIC TITRATION
Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

AMPHIBIA
Age Structure of Populations of Some Amphibia on Banks of Water Reservoirs (In Czech),
W74-02650 2H

ANAEROBIC CONDITION
Some Limnological Remarks on Lake Saizuchi-Numa, Yamagata Prefecture, (In Japanese),
W74-02207 5C

ANALYTICAL TECHNIQUES
Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

ANIMAL POPULATIONS
The Age Group Distribution of Pelobates fuscus (Laur.) at the Kuibyshev Reservoir Shores (In Russian),
W74-02641 2H

ANION EXCHANGE
Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

Anionic Exchange Separations of the Elements that can be Extracted with Tributyl Phosphate. II, (Anionenaustauschtrennungen der mit Tributylphosphat extrahierbaren Elemente. II),
W74-02432 2K

ANISOTROPY
Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

Unsteady Drawdown at a Partially Penetrating Well in a Transversely Isotropic Artesian Aquifer,
W74-02466 4B

ANKISTRODESMUS-BRAUNII
Effect of Supernatant Fluid of the Ankistro-Desmus braunii Brunnth Culture on Development of Algae in Waste Waters of the Chernigov Chemical Fiber Industrial Group, (In Ukrainian),
W74-02245 5C

ANTARCTIC LIMNOLOGY
Antarctic Limnology: A Review,
W74-02552 2C

ANTICHOLINESTERASES
Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

AQUATIC ENVIRONMENT
Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

AQUATIC HABITATS
Some Chemical and Biological Characteristics of the Mississippi River Bordering Iowa,
W74-02363 5B

Water Resources Development in the Mullica River Basin,
W74-02450 5C

An Evaluation of Space Acquired Data as a Tool for Management of Wildlife Habitat in Alaska,
W74-02596 7B

AQUATIC INSECTS
A New Aquatic Insect Trap,
W74-02551 7B

Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

AQUATIC MICROORGANISMS
Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

AQUEOUS SOLUTIONS
Extraction and Spectrophotometric Determination of Vanadium as a Mixed Ligand Complex of Oxine and Azide,
W74-02362 5A

Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

Picloram Photolytic Decomposition,
W74-02383 5B

Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

Nuclear Magnetic Resonance Relaxation Titration,
W74-02402 2K

Analysis by Means of Gas Bubble Electrification,
W74-02406 2K

Adsorption Characteristics of Silber, Lead, Cadmium, Zinc, and Nickel on Borosilicate Glass, Polyethylene, and Polypropylene Container Surfaces,
W74-02412 5A

Experimental Study of the Phase-Selective Anodic Stripping Analysis of Micromolar Cadmium (II) at the Micrometer Hanging Mercury Drop Electrode in 0.1 m Potassium Chloride,
W74-02415 2K

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

AQUIFCULTURE
Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

AQUIFER CHARACTERISTICS
The Role of Deformation in Changing the Reservoir Properties of Aquifers,
W74-02446 2F

Unsteady Drawdown at a Partially Penetrating Well in a Transversely Isotropic Artesian Aquifer,
W74-02466 4B

Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

AQUIFERS
Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

Groundwater Exploration and Provision from the Hydrogeological Point of View,
W74-02353 4B

A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

ARAL SEA AREA
A Hydrogeothermal Description of Groundwater in Upper Cretaceous Deposits in the Southeast Aral Sea Area (Gidrogeotermicheskaya kharakteristika podzemnykh vod verkhnego mela Yugo-Vostochnogo Priaral'ya),
W74-02609 2F

ARID LANDS
Groundwater Exploration and Provision from the Hydrogeological Point of View,
W74-02353 4B

The Use of Desalted Seawater for Intensive Agricultural Applications, (El Uso de Agua de Mar Desalada Para Intensivas Aplicaciones Agricolas),
W74-02359 3A

ARIZONA
A Way to Make the Desert Green,
W74-02346 3B

Trickle Irrigation on Cotton,
W74-02347 3F

Guide to Improvement of Arizona Rangeland.
W74-02349 4A

Use of Digital Computer Techniques in Water Resources Data Storage,
W74-02357 4B

ARKANSAS
Environmental Defense Fund, Inc. V. Froehlke (Action Brought for Declaratory Judgment and Injunction Restraining Completion of Reservoir Project).
W74-02524 6E

AROMATIC COMPOUNDS
A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

ARSENIC
Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

ARTESIAN AQUIFERS
Unsteady Drawdown at a Partially Penetrating Well in a Transversely Isotropic Artesian Aquifer,
W74-02466 4B

ARTIFICIAL PRECIPITATION
Weather Modification Operations In California, October 1, 1970-September 30, 1971,
W74-02293 3B

ARTIFICIAL RECHARGE
Flow Analysis of Hydraulic Connectors in Artificial Recharge Systems, A Model Study,
W74-02219 4B

Ground-Water Recharge for Urban Use: Leaky Acres Project,
W74-02468 4B

ASPHALTENES
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

ASPLANCHNA-PRIODONTA
Lake Sary-Chelek and its Zooplankton, (In Russian),
W74-02261 2H

ATMOSPHERE
Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

ATOMIC ABSORPTION SPECTROPHOTOMETRY
Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

ATRAZINE
Influence of Herbicides on Microbiological Conditions,
W74-02548 5B

ATTITUDES
User Related Study of Three Michigan Rivers,
W74-02202 6B

AU SABLE RIVER (MICH)
Economic Evaluation of the Sport Fishery of the Au Sable River, Michigan,
W74-02203 6B

AUSTIN (TEXAS)
City of Austin, Texas, Study of Wastewater Collection System: Phase I.
W74-02330 5D

AUSTRALIA (N.S.W.)
Occurrence of Silica in the Natural Waters of the Huntley-Robertson District, Southern New South Wales,
W74-02555 2K

AUTOMATIC CONTROL
Printout Colorimeter for Autoanalysis of Water Pollution,
W74-02374 5A

Analysis of High-Purity Water by Flameless Atomic-Absorption Spectroscopy. Part II. Signal Integration with a Non-Resonance Line Correction System for Spurious Absorption Phenomena,
W74-02385 5A

A Pneumatic Sample Changer for Gamma-Ray Spectroscopy,
W74-02407 7B

High Precision Sampling for Chromatographic Separations,
W74-02414 2K

An Automated Analysis for Urea in Seawater,
W74-02421 5A

AVALANCHE FORECASTING
Predicting Avalanche Intensity from Weather Data: A Statistical Analysis,
W74-02294 2C

AVALANCHES
Predicting Avalanche Intensity from Weather Data: A Statistical Analysis,
W74-02294 2C

AZOTOBACTER
Influence of Herbicides on Microbiological Conditions,
W74-02548 5B

BACTERIA
The Quantity and Dimensions of Microorganisms in Bottom Sediments of Fish-Breeding Ponds (In Russian),
W74-02228 8I

Microflora and Chemical Composition of the Bottom Deposits of the Kairak-Kum Reservoir, (In Russian),
W74-02253 5B

Hygienic Conditions in the Procurement of Drinking Water from Individual Sources (In German),
W74-02547 5B

The Effect of Organic Substrates on the Abundance of Bacteria in the Water of 5 Masurian Lakes,
W74-02556 5C

A Report on Bacterial Pollution Affecting Shellfish Harvesting in Newport River, North Carolina.
W74-02621 5B

BACTERIAL COMMUNITY
The Effect of Temperature on the Generation Time of a Bacterial Community in Lake Water,
W74-02557 5B

BACTERIAL DECOMPOSITION
The Ability of Bacteria to Mineralize Algae Organic Matter, (In Russian),
W74-02252 5B

BANKS
Coleman V. Forister (Suit to Establish Right of Use of Land for Ingress and Egress to Creek Waterfront).
W74-02517 6E

BARLEY
The Action of Abscisic Acid on Ion Uptake and Water Flow in Plant Roots,
W74-02260 3F

BAYES THEOREM
A Bayesian Decision Framework for Synthetic Hydrology,
W74-02438 6A

BEACH EROSION
A Study on the Erosion of Niigata Beach from ERTS-A Imagery,
W74-02584 7B

Sedimentation and Scour Off Nuclear Power Plants,
W74-02645 2J

Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

BEACHES
Two-Dimensional Waves Generated by a Surface Pressure Disturbance Over a Sloping Beach,
W74-02187 2E

Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

Easements: Judicial and Legislative Protection of the Public's Rights in Florida's Beaches,
W74-02508 6E

Public Access to Beaches: Common Law Doctrines and Constitutional Challenges.
W74-02512 6E

Wave Breaking in Shallow Water,
W74-02638 2L

An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

BEAR GLACIER
Bear Glacier Has Come Alive (Lednik Medvezhiy ozhil),
W74-02614 2C

BENEFITS
The Ex Post Measurement of Benefits and Costs in Small Watershed Projects,
W74-02212 6B

BENTHAL OXYGEN DEMAND
A Study of the Factors Determining the Oxygen Uptake of Benthal Stream Deposits,
W74-02451 5C

BENTHIC FAUNA
The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

A Study of the Factors Determining the Oxygen Uptake of Benthal Stream Deposits,
W74-02451 5C

BENTHOS
An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

A Study of the Factors Determining the Oxygen Uptake of Benthal Stream Deposits,
W74-02451 5C

BENZENOIDS
Chemistry of Marine Natural Products,
W74-02189 5B

BERYLLIUM
Analytical Applications of Gas Chromatography of Metal Chelates,
W74-02366 2K

BETA-VULGARIS-F-RUBRA
Study of the Intracellular Water State in Plants Under the Effect of Phenols, (In Russian),
W74-02234 2I

BIBLIOGRAPHIES
Selected References, Ground-Water Contamination, The United States of America and Puerto Rico.
W74-02482 5B

Evapotranspiration and Watershed Research as Related to Riparian and Phreatophyte Management--An Abstract Bibliography.
W74-02630 2D

Research Pertinent to Environmental Quality Concerning the Period, 1967-1971.
W74-02648 2L

BIG SIOUX RIVER VALLEY (S DAK)
Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

BIGHORNS (WYO-MONT)
Structural Interpretations Based on ERTS-1 Imagery, Bighorn Region, Wyoming-Montana,
W74-02568 7B

BIOACCUMULATION
Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

BIOASSAY
Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

BIOCHEMICAL OXYGEN DEMAND
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

Mathematical Relationships of BOD Removal in Activated Sludge Process,
W74-02176 5D

Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

A Study of the Factors Determining the Oxygen Uptake of Benthal Stream Deposits,
W74-02451 5C

Nitrification of BOD-Containing Water,
W74-02485 5D

BIOCLIMATES
Agroclimatic Areas for Wheat and Bioclimatic Characteristics of its Cultivars in Uruguay, (In Spanish),
W74-02354 3F

BIODEGRADATION
Problems with Colored Papers: Are They a Cause of Pollution, (Probleme mit farbigen Papieren: Sind sie eine Ursache von Verschmutzung),
W74-02255 5B

Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

Hydrocarbon-Oxidizing Bacteria and Their Possible Use as Controlling Agents of Oil Pollution in the Ocean,
W74-02618 5G

BIOINDICATORS
Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

BIOLOGICAL SAMPLES
Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

BIOLOGICAL TREATMENT
Nitrification of BOD-Containing Water,
W74-02485 5D

BIOMASS (PLANKTON)
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Tritylmorpholine Association (In French),
W74-02226 5C

BITTERROOT RIVER (MONT)
Floodplain Mapping and Planning for the 50 and 100-Year Interval Flood Zones of the Bitterroot Valley, Montana,
W74-02215 4A

BLACK SEA REGION
Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

BLEACHING WASTES
Color Removal from Kraft Pulp Mill Effluents by Massive Lime Treatment,
W74-02284 5D

Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

BLUE CRAB
Iron, Zinc, Magnesium, and Copper Concentrations in Body Meat of the Blue Crab, Callinectes sapidus,
W74-02409 5A

BLUEGULLS
Growth Rates of Lepomis macrochirus (Centrarchidae) in Three Areas of Lake Texoma,
W74-02422 2H

BOILER FEED WATER
Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

BOISE VALLEY (IDAHO)
Effect of Irrigation, Fertilization, and Other Cultural Practices on Water Quality,
W74-02321 5C

BOLINAS LAGOON (CALIF.)
Bolinas Lagoon, Marin County, California, Summary of Sedimentation and Hydrology, 1967-69,
W74-02296 2L

BOMBINA-BOMBINA
Age Structure of Populations of Some Amphibia on Banks of Water Reservoirs (In Czech),
W74-02650 2H

BORIC ACID
Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

BOTTOM DEPOSITS
Microflora and Chemical Composition of the Bottom Deposits of the Kairak-Kum Reservoir, (In Russian),
W74-02253 5B

BOTTOM FAUNA
Quantitative Estimation of Bottom Fauna in Lake Mariut,
W74-02549 2H

BOTTOM SEDIMENTS
The Quantity and Dimensions of Microorganisms in Bottom Sediments of Fish-Breeding Ponds (In Russian),
W74-02228 8I

Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

BOTTOM WATER SAMPLER
An Improved Bottom-Water Sampler,
W74-02410 7B

BOUNDARY DISPUTE
Coleman V. Forister (Suit to Establish Right of Use of Land for Ingress and Egress to Creek Waterfront).
W74-02517 6E

BOUNDARY DISPUTES
Scientific Aspects of Maritime Sovereignty Claims,
W74-02498 6E

BOUNDARY PROCESSES
Flow in Open Channels With Smooth Curved Boundaries,
W74-02312 8B

BRAZOS RIVER BASIN (TEX)
Annual Compilation and Analysis of Hydrologic Data for Green Creek, Brazos River Basin, Texas, 1971,
W74-02626 4D

BREAKERS
Wave Breaking in Shallow Water,
W74-02638 2L

BREWERIES
Occurrence of Saprochaete saccharophyla Coker Et Shanor in Fungoid Growth below the Discharge of Breweries, (In Czech),
W74-02242 5B

BRIDGE CONSTRUCTION
Effects of Highway Bridge Construction on a Subarctic Stream,
W74-02295 4C

BRIDGES
Hydrologic Evaluations in Bridge Pier Scour Design,
W74-02309 8B

BRUSH CONTROL
Guide to Improvement of Arizona Rangeland.
W74-02349 4A

BUBBLE-FILM-STRIPPING MECHANISM
Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

BUFFALO RIVER (N.Y.)
Surface Quality Assessment of Natural Bodies of Water,
W74-02181 5A

BURNING
Detection, Mapping and Estimation of Rate Spread of Grass Fires from Southern African ERTS-1 Imagery,
W74-02576 7B

BYPRODUCTS
Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

CADMIUM
Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

Experimental Study of the Phase-Selective Anodic Stripping Analysis of Micromolar Cadmium (II) at the Micrometer Hanging Mercury Drop Electrode in 0.1 m Potassium Chloride,
W74-02415 2K

A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

CALCIUM
Accumulation of Strontium and Calcium in Freshwater Fishes of Japan,
W74-02197 5C

CALCIUM ABSORPTION
Relation of Mineral and Hormone Metabolism to Intake of Water with a High Natural Content of Fluoride,
W74-02235 5C

CALCIUM CARBONATE
Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

CALIBRATIONS
Calibrating A Water Yield Model for Small Ungaged Watersheds,
W74-02172 2A

Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

CALIFORNIA
In-Pipe Wastewater Cleanup.
W74-02269 5D

Weather Modification Operations In California, October 1, 1970-September 30, 1971,
W74-02293 3B

Bolinas Lagoon, Marin County, California, Summary of Sedimentation and Hydrology, 1967-69,
W74-02296 2L

Prescribed Fire Effects on Water Repellency, Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4C

Ground-Water Recharge for Urban Use: Leaky Acres Project,
W74-02468 4B

Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

California High Water, 1970-1971,
W74-02474 2E

Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

Flood Control Project Maintenance and Repair--1970 Inspection Report,
W74-02617 2E

CALIFORNIA WATER CODE
Flood Control Funds -- 1970 Report to the Legislature.
W74-02292 6C

CANADA
Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

Characterization and Treatment of Fish Processing Plant Effluents in Canada,
W74-02262 5D

The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

Advanced Practical Water Recycle in Tissue Manufacture,
W74-02279 5D

Evaluation of Soil Moisture Regime in a Watershed,
W74-02355 2G

Legal Developments in Canadian Water Management,
W74-02505 6E

CANAL LININGS
Studies on Seepage from Canals with Partial Lining,
W74-02319 4A

CANAL SEEPAGE
Studies on Seepage from Canals with Partial Lining,
W74-02319 4A

CAPACITOR PAPER
Manufacture of Capacitor Paper -- Some Problems with Fresh Water Preparation, (Erzeugung von Kondensatorpapier -- einige Probleme bei der Frischwasserherstellung),
W74-02247 5D

CARBON
In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

CARBON DIOXIDE
Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

CARBONDALE (ILLINOIS)
Fourth Annual Report, City of Carbondale, Illinois, Water and Wastewater Treatment.
W74-02328 5D

CARIES (HUMAN)
Cleanliness of Wells, Chemical Substances in Drinking Water and Their Relation to Caries (In Polish),
W74-02544 5C

CARP
Accumulation of Strontium and Calcium in Freshwater Fishes of Japan,
W74-02197 5C

CARPATHIANS
Storm Rainfall in the Carpathians in June 1969,
W74-02606 2B

CATIONS
Ion-Exchange Separations on Mixed Columns,
W74-02398 5A

CATTLE
Soil Pollution from Cattle Feedlots in Georgia,
W74-02210 5B

The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

CAYUGA LAKE (N.Y.)
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

CAYUGA LAKE (NEW YORK)
Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

CEMENT
Effect of A Cement Anticorrosion Coating on the Quality of Drinking Water, (In Russian),
W74-02233 5B

CESIUM-137
Some Characteristics of Cesium-137 Accumulation in Populations of Freshwater Fish, (In Russian),
W74-02196 5C

Distribution of Caesium-137 in British Coastal Waters,
W74-02365 5B

CHANNEL EROSION
Hydrologic Evaluations in Bridge Pier Scour Design,
W74-02309 8B

Bed Scour at End-Dump Channel Constrictions,
W74-02316 8B

CHARCOAL-CHLOROFORM EXTRACTION
Using the Adsorption Method on Activated Charcoal with Chloroform Extraction (CCE) for Evaluating Water Pollution by Organic Substances, (In Russian),
W74-02232 5B

CHELATING AGENTS
Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

CHELATION
Analytical Applications of Gas Chromatography of Metal Chelates,
W74-02366 2K

CHEMICAL ANALYSIS
Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

Analyzing Heavy Ends of Crude,
W74-02378 5A

Picloram Photolytic Decomposition,
W74-02383 5B

Analysis of High-Purity Water by Flameless Atomic-Absorption Spectroscopy. Part II. Signal Integration with a Non-Resonance Line Correction System for Spurious Absorption Phenomena,
W74-02385 5A

The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

Analysis by Means of Gas Bubble Electrification,
W74-02406 2K

Hanging Mercury Drop Electrodeposition Technique for Carbon Filament Flameless Atomic Absorption Analysis. Application to the Determination of Copper in Sea Water,
W74-02411 2K

Experimental Study of the Phase-Selective Anodic Stripping Analysis of Micromolar Cadmium (II) at the Micrometer Hanging Mercury Drop Electrode in 0.1 m Potassium Chloride,
W74-02415 2K

Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

Anionic Exchange Separations of the Elements that can be Extracted with Tributyl Phosphate. II, (Anionenaustauschtrennungen der mit Tributylphosphat extrahierbaren Elemente. II),
W74-02432 2K

Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

CHEMICAL COMPOSITION
The Chemical Composition and Flow of the South Winterbourne in Dorset,
W74-02190 2K

Microflora and Chemical Composition of the Bottom Deposits of the Kairak-Kum Reservoir, (In Russian),
W74-02253 5B

CHEMICAL FIBER WASTES
Effect of Supernatant Fluid of the Ankistro-Desmus braunii Brunnth Culture on Development of Algae in Waste Waters of the Chernigov Chemical Fiber Industrial Group, (In Ukrainian),
W74-02245 5C

CHEMICAL INDICATORS
Selection of Experimental Conditions for the Photometric Complex Formation Titrations of Metals in the PPM-Range,
W74-02404 5A

CHEMICAL LOSS
Adsorption Characteristics of Silber, Lead, Cadmium, Zinc, and Nickel on Borosilicate

Glass, Polyethylene, and Polypropylene Container Surfaces,
W74-02412 5A

CHEMICAL PRECIPITATION
Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

CHEMICAL PROPERTIES
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

CHEMICAL REACTIONS
Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

CHEMICAL RECOVERY
Sodium Recovery from a Pulp Mill Waste Effluent by Ion Exchange,
W74-02259 5D

Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

CHEMICAL STRUCTURE
Chemistry of Marine Natural Products,
W74-02189 5B

CHEMICAL WASTES
U.S. V. American Cyanamid Company (Action for Discharge into Navigable Waterways).
W74-02522 6E

CHEMISTRY
Chemistry of Marine Natural Products,
W74-02189 5B

CHERNOZEMS
Moisture Regime of Southern Chernozem Within Shelterbelts, (Rezhim vlazhnosti yuzhnogo chernozema v sisteme lesnykh polos),
W74-02302 2G

CHIRCHIK RIVER
Chemical Characteristics of Surface Waters in the Upper Chirchik River Basin (Khimicheskaya kharakteristika poverkhnostnykh vod verkhney chasti basseyna r. Chirchik),
W74-02612 2K

CHLORELLA
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

CHLORIDES
Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

Analytical Applications of Gas Chromatography of Metal Chelates,
W74-02366 2K

CHLORINATED HYDROCARBON PESTICIDES
Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

CHLORINATED HYDROCARBONS
Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

CHLORINATION
The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

Sewage Treatment Apparatus,
W74-02489 5D

Public Water Supplies--Chlorination.
W74-02538 5G

CHLORODIOXINS
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

CHLOROPHYTA
Effect of Heated Water from Konakov Hydro-Electric Station on Oxygen Content and Development of Phytoplankton in Ivan'Kovskoe Reservoir During Winter, (In Russian),
W74-02244 5B

CHLORPHYTA
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

CHROMATOGRAPHIC SAMPLING VALVES
High Precision Sampling for Chromatographic Separations,
W74-02414 2K

CHROMATOGRAPHY
High Precision Sampling for Chromatographic Separations,
W74-02414 2K

Potentiality of the Coupling of Column Liquid Chromatography and Field Desorption Mass Spectrometry,
W74-02430 2K

CHROMIUM
Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

CHROMOGENIC REAGENTS
Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

CHRYSOPHYCEAE
On Mallomonas lelymeme Harris Et Bradley (Chrysophyceae), (In Japanese),
W74-02550 2H

CICHLIDAE
Comparative Biology of Tilapia rendalli (Boulenger) (Pisces cichlidae) in Lake Itasy and Lake Mantasoa, (In French),
W74-02344 2H

CILIATED PROTOZOA
Ciliated Protozoa. An Illustrated Guide to the Species Used as Biological Indicators in Freshwater Biology,
W74-02236 2I

CINDER SETTLING TANKS
Effect of a Cinder Settling Tank of a Thermal Electric Power Plant on the Quality of Subsurface Waters, (In Russian),
W74-02231 5B

CITY PLANNING
City of Austin, Texas, Study of Wastewater Collection System: Phase I.
W74-02330 5D

CLADOCERA
Some Further Results of the Zooplankton Studies in the Czechslovak-Hungarian Stretch of the Danube,
W74-02545 2I

CLEAR AIR TURBULENCE
Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

CLEARWATER (FLA)
Hydrogeologic Aspects of a Proposed Sanitary Landfill Near Old Tampa Bay, Florida,
W74-02628 5E

CLIMATIC DATA
Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

Application and Consequences of Precipitation Observations in the Republic of Sudan in View of the Nomadic Life and Economy,
W74-02348 2B

Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

CLOGGING
Determination of the Mechanical Compatibility of Porous Rocks with Waste Water in its Subsurface Disposal,
W74-02165 5B

CLOSTERIUM-SPP
On the Relation Between the Occurrence of Desmids and the Salinity in the Hokuriku District of Japan, (In Japanese).
W74-02191 5B

CLOUD SEEDING
Weather Modification Operations In California, October 1, 1970-September 30, 1971,
W74-02293 3B

CLOUDS
Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

COAGULATION
The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

COAL GASIFICATION
'Clean Energy Via Coal Gasification',
W74-02462 6B

COALS
'Clean Energy Via Coal Gasification',
W74-02462 6B

COASTAL ENGINEERING
Approaches to State Coastal Management,
W74-02185 2L

An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

Bulletin and Summary of Research Progress Fiscal Years 1970-71.
W74-02647 2L

COASTAL PLAINS
A Self-Draining Subsurface Rainfall Conservation System: Its Effect on the Soil Water Status and Productivity of Coastal Plains Sands,
W74-02193 2G

Guidelines for the Coastal Zone.
W74-02510 2L

Lineaments in Coastal Plain Sediments as Seen in ERTS Imagery,
W74-02566 7B

COASTS
Two-Dimensional Waves Generated by a Surface Pressure Disturbance Over a Sloping Beach,
W74-02187 2E

Research in the Coastal and Oceanic Environment,
W74-02481 2L

Easements: Judicial and Legislative Protection of the Public's Rights in Florida's Beaches,
W74-02508 6E

Public Access to Beaches: Common Law Doctrines and Constitutional Challenges.
W74-02512 6E

Use of ERTS-1 in Coastal Studies,
W74-02633 2L

Wave Breaking in Shallow Water,
W74-02638 2L

An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

Bulletin and Summary of Research Progress Fiscal Years 1970-71.
W74-02647 2L

Research Pertinent to Environmental Quality Concerning the Period, 1967-1971.
W74-02648 2L

COBALT
Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

COBALT-60
Calculation of Dose Conversion Factors for 60Co Gamma Radiation in Water, (In German),
W74-02198 5B

COHO SALMON
Puget Sound Resident Coho Salmon Study,
W74-02639 2L

COLLIER COUNTY (FLA)
Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

COLOR
Color Removal from Kraft Pulp Mill Effluents by Massive Lime Treatment,
W74-02284 5D

COLORADO
Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

Predicting Avalanche Intensity from Weather Data: A Statistical Analysis,
W74-02294 2C

COLORED PAPER
Problems with Colored Papers: Are They a Cause of Pollution, (Probleme mit farbigen Papieren: Sind sie eine Ursache von Verschmutzung),
W74-02255 5B

COLORIMETRY
Printout Colorimeter for Autoanalysis of Water Pollution,
W74-02374 5A

COMBINED SEWERS
Water Quality Characteristics of Storm Sewer Discharges and Combined Sewer Overflows,
W74-02345 5B

COMBINED TREATMENT
Hylte Bruk: Newsprint and Environmental Protection, (Hylte Bruk: Zeitungsdruckpapier and Umweltschultz).
W74-02256 5D

COMPLEXATION
Extraction and Spectrophotometric Determination of Vanadium as a Mixed Ligand Complex of Oxine and Azide,
W74-02362 5A

COMPREHENSIVE PLANNING
City of Austin, Texas, Study of Wastewater Collection System: Phase I.
W74-02330 5D

General Soils Study: Pearl River, Hancock, Harrison Counties, Mississippi.
W74-02333 2G

A Water and Sewer Plan: Greene County, Georgia.
W74-02334 5D

A Water and Sewer Plan: Morgan County, Georgia.
W74-02335 5D

A Water and Sewer Plan: Madison County, Georgia.
W74-02336 5D

A Water and Sewer Plan: Walton County, Georgia.
W74-02337 5D

Regional Wastewater Facilities Study.
W74-02338 5D

Northeast Georgia Area Water and Sewer Systems Plan and Capital Improvement Program.
W74-02339 3D

COMPUTER MODELS
Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

COMPUTER PROGRAMS
System 21, 'Jupiter' (A Design System for Two-Dimensional Nearly-Horizontal Flows),
W74-02159 7C

Optimization of Industrial Systems with the Separable Programming and the Generalized Reduced Gradient Methods,
W74-02213 5G

Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

Computer Simulation of Storm Water Runoff,
W74-02310 2E

Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

Hymo: Problem-Oriented Computer Language for Hydrologic Modeling--Users Manual,
W74-02469 2A

COMPUTER SIMULATION
A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

CONDEMNATION
Canyon Public Service District V. Tasa Coal Company (Eminent Domain Proceeding Held Public Service District had Right to Condemn Defendant's Lands for Use in Connection with Sewer Facilities, Defendant Appeals) .
W74-02531 6E

CONDENSER PAPER
Manufacture of Capacitor Paper – Some Problems with Fresh Water Preparation, (Er-

zeugung von Kondensatorpapier -- einige Probleme bei der Frischwasserherstellung),
W74-02247 5D

CONDENSERS
Internally Interconnected Multi-Stage Distillation System,
W74-02496 3A

CONFERENCES
(TAPPI) Environmental Conference, May 14-16, 1973.
W74-02273 5D

State Water Plan, Proceedings of 18th Annual New Mexico Water Conference.
W74-02456 6B

CONJUNCTIVE USE
Water Resources Development in the Mullica River Basin,
W74-02450 5C

A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

CONSERVATION
Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

CONSOLIDATION
Legal and Institutional Constraints in Consolidating Irrigation Systems,
W74-02533 3F

CONSTRUCTION COSTS
Water and Sewerage Improvements Needed in 1975 in Chatham County, Georgia.
W74-02186 5D

CONTINENTAL MARGINS
Indices of National Interest in the Oceans,
W74-02499 6E

CONTINENTAL SHELF
Scientific Aspects of Maritime Sovereignty Claims,
W74-02498 6E

Indices of National Interest in the Oceans,
W74-02499 6E

Development of the Freedom of Scientific Research Issue of the Third Law of the Sea Conference,
W74-02501 6E

Submerged Lands.
W74-02540 6E

COPEPODA
Some Further Results of the Zooplankton Studies in the Czechslovak-Hungarian Stretch of the Danube,
W74-02545 2I

COPEPODS
Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

COPPER
Iron, Zinc, Magnesium, and Copper Concentrations in Body Meat of the Blue Crab, Callinectes sapidus,
W74-02409 5A

Hanging Mercury Drop Electrodeposition Technique for Carbon Filament Flameless Atomic Absorption Analysis. Application to the Determination of Copper in Sea Water,
W74-02411 2K

A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

CORN (FIELD)
Dry Activated Sludge as Fertilizer for Winter Wheat and Corn, (Sukhoi aktivnyi il kak udobrenie dlya posevov ozimi pshenits' i kukuruz'),
W74-02270 5D

CORNING (N.Y.)
Flood of June 1972 at Corning, New York,
W74-02479 7C

CORROSION CONTROL
Effect of A Cement Anticorrosion Coating on the Quality of Drinking Water, (In Russian),
W74-02233 5B

COST ANALYSIS
Economic Evaluation of the Sport Fishery of the Au Sable River, Michigan,
W74-02203 6B

Economic Aspects of Environmental Protection (In German),
W74-02227 5G

Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

COST-BENEFITS ANALYSIS
The Ex Post Measurement of Benefits and Costs in Small Watershed Projects,
W74-02212 6B

COST-EFFECTIVENESS
Cost Effectiveness of Current Environmental Engineering Practices,
W74-02225 5D

COST MINIMIZATION
Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

COST SHARING
The Problems and Issues of Implementing the Federal Water Project Recreation Act in the Pacific Northwest,
W74-02453 6C

COSTS
Flood Control Funds -- 1970 Report to the Legislature.
W74-02292 6C

COTTON
Grasshoppers and Crickets in the Karshi Steppe, (In Russian),
W74-02239 3F

Trickle Irrigation on Cotton,
W74-02347 3F

CRABS
Iron, Zinc, Magnesium, and Copper Concentrations in Body Meat of the Blue Crab, Callinectes sapidus,
W74-02409 5A

CRETACEOUS PERIOD
A Hydrogeothermal Description of Groundwater in Upper Cretaceous Deposits in the Southeast Aral Sea Area (Gidrogeotermicheskaya kharakteristika podzemnykh vod verkhnego mela Yugo-Vostochnogo Priaral'ya),
W74-02609 2F

CRICKETS
Grasshoppers and Crickets in the Karshi Steppe, (In Russian),
W74-02239 3F

CROP PRODUCTION
A Way to Make the Desert Green,
W74-02346 3B

CROP RESPONSE
Trickle Irrigation on Cotton,
W74-02347 3F

CRUDE OIL
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

Analyzing Heavy Ends of Crude,
W74-02378 5A

CRUSTACEANS
Description, Distribution, and Ecology of the Rotifer and Crustacean Plankton Communities, Flathead Lake, Montana,
W74-02448 2H

Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

CRYPTOCHIRONOMUS
Contribution to the Study of Zooplankton and Zoobenthos in the Mingechaur Reservoir, (In Russian),
W74-02341 2H

CRYSTALS
Experience in a Quantitative Assessment of Organization of Snow Cover as a Natural System (Opyt kolichestvennoy otsenki organizatsii snezhnogo pokrova kak prirodnoy sistemy),
W74-02613 2C

CURRENTS (WATER)
System 21, 'Jupiter' (A Design System for Two-Dimensional Nearly-Horizontal Flows),
W74-02159 7C

CYANOPHYTA
Effect of Heated Water from Konakov Hydro-Electric Station on Oxygen Content and Development of Phytoplankton in Ivan'Kovskoe Reservoir During Winter, (In Russian),
W74-02244 5B

CYNOSCION ARENARIUS
Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

CYPRINID FISH
Considerations Concerning the Biology and Distribution Area of the Cyprinid Fish Pseudorasbora parva (Schlegel) in the Romanian Waters,
W74-02553 2I

CZECHOSLAVAKIA (BOHEMIA)
Occurrence of Saprochaete saccharophyla Coker Et Shanor in Fungoid Growth below the Discharge of Breweries, (In Czech),
W74-02242 5B

DAM FAILURE
Dam-Break Flood in a Prismatic Dry Channel,
W74-02311 8B

DAMPING (WATER WAVES)
Damping of Water Waves Over Porous Bed,
W74-02315 2E

DAMS
Bed Scour at End-Dump Channel Constrictions,
W74-02316 8B

Environmental Defense Fund, Inc. V. Froehlke (Action Brought for Declaratory Judgment and Injunction Restraining Completion of Reservoir Project).
W74-02524 6E

DANUBE RIVER
Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

Some Further Results of the Zooplankton Studies in the Czechslovak-Hungarian Stretch of the Danube,
W74-02545 2I

Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

DATA COLLECTIONS
Mapping Average Annual Surface Water Resources of the Hydrological Regions of Nelson, New Zealand,
W74-02290 2E

General Soils Study: Pearl River, Hancock, Harrison Counties, Mississippi.
W74-02333 2G

Water Resources of Lee County, Mississippi,
W74-02340 4B

Use of Digital Computer Techniques in Water Resources Data Storage,
W74-02357 4B

Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

DATA PROCESSING
Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

Digital Analysis of Potomac River Basin ERTS Imagery: Sedimentation Levels at the Potomac-Anacostia Confluence and Strip Mining in Allegheny County, Maryland,
W74-02583 7B

DATA STORAGE AND RETRIEVAL
Use of Digital Computer Techniques in Water Resources Data Storage,
W74-02357 4B

DECISION MAKING
Input Specifications to Stochastic Decision Models,
W74-02209 2E

DECISION THEORY
A Bayesian Decision Framework for Synthetic Hydrology,
W74-02438 6A

DECOLORIZATION
Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

DECOMPOSING
The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

DEFORMATION
The Role of Deformation in Changing the Reservoir Properties of Aquifers,
W74-02446 2F

Hyperbolic Stress Equations for Compressible Slabs,
W74-02624 2C

DEGRADATION PRODUCTS
Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

DEGRADATION RATES
Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

DELAWARE
A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

Research in the Coastal and Oceanic Environment,
W74-02481 2L

DELAWARE PIEDMONT
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

DEMAND
The Demand for and Value of the Sport Fishery on the Au Sable, Jordan, and Red Cedar Rivers,
W74-02204 6B

DENTAL DECAY
Sixteen Years of Water Fluoridation in the Netherlands and Its Influence on Dental Decay,
W74-02229 5F

DESALINATION
Another Rio Grande for New Mexico,
W74-02461 3A

Multi-Stage Flash Evaporator,
W74-02490 3A

Internally Interconnected Multi-Stage Distillation System,
W74-02496 3A

DESALINATION PLANTS
The Use of Desalted Seawater for Intensive Agricultural Applications, (El Uso de Agua de Mar Desalada Para Intensivas Aplicaciones Agricolas),
W74-02359 3A

DESALINATION PROCESSES
Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

DESERT STRIP FARMING
A Way to Make the Desert Green,
W74-02346 3B

DESERTS
Ecological and Phytosociological Study of a Sector in the Lybian Desert,
W74-02507 2I

DESIGN
Optimum Design Period for Water Pollution Control Plants,
W74-02222 5D

DESMIDS
On the Relation Between the Occurrence of Desmids and the Salinity in the Hokuriku District of Japan, (In Japanese).
W74-02191 5B

DESORPTION
Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

DETERGENTS
Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

DICAMBA
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

DIFFUSION
The Turbulent Temperature Mixing Layer,
W74-02162 8B

Field Tests on Transverse Mixing in Rivers,
W74-02318 5B

DIRECT DYES
Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

DISCHARGE
State of New Jersey, Department of Environmental Protection V. Jersey Central Power and Light Company (Action to Enforce Penalty Provision for Discharge of Harmful Substance into Tidal Waters).
W74-02520 6E

DISCHARGE (WATER)
State of New Jersey, Department of Environmental Protection V. Jersey Central Power and Light Company (Action to Enforce Penalty Provision for Discharge of Harmful Substance into Tidal Waters).
W74-02520 6E

DISINFECTION
Method and Apparatus for Electrolytic Treatment of Sewage,
W74-02486 5D

DISPERSION
The Turbulent Temperature Mixing Layer,
W74-02162 8B

Dispersion in Flow from a Continuous Source at Sea,
W74-02163 5B

Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

Field Tests on Transverse Mixing in Rivers,
W74-02318 5B

Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

DISSOLVED OXYGEN
Salinity Corrections for Dissolved Oxygen Measurements,
W74-02424 5A

The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

DISTILLATION
Internally Interconnected Multi-Stage Distillation System,
W74-02496 3A

DISTRIBUTION
Probability Analysis in an Approximate Theory of Movement of Water Masses, (Veroyatnostnyy analiz v priblizhennoy teorii peremeshcheniya vodnykh mass),
W74-02305 2E

DISTRIBUTION PATTERNS
Distribution of Caesium-137 in British Coastal Waters,
W74-02365 5B

Quantitative Estimation of Bottom Fauna in Lake Mariut,
W74-02549 2H

DITCHES
Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

DOCUMENTATION
Fourth Annual Report, City of Carbondale, Illinois, Water and Wastewater Treatment.
W74-02328 5D

DOMESTIC WASTES
Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

DOSE CONVERSION
Calculation of Dose Conversion Factors for 60Co Gamma Radiation in Water, (In German),
W74-02198 5B

DRAGONFLIES
The Phenology of Dragonflies in the Dehra Dun Valley, India,
W74-02237 2I

DRAINAGE
Levees and Drains--Change of Water-Courses.
W74-02536 6E

DRAINAGE AREA
River Regimes in Iran,
W74-02298 2E

DRAWDOWN
Unsteady Drawdown at a Partially Penetrating Well in a Transversely Isotropic Artesian Aquifer,
W74-02466 4B

DREDGING
Yoffe V. Special Board, Chapter 387, (State Denial of License to Exploit Natural Resources of a Lake Bed).
W74-02514 6E

DROUGHTS
Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

DRY CARBON
Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

DTPA
Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

DUCKS (WILD)
An Evaluation of Space Acquired Data as a Tool for Management of Wildlife Habitat in Alaska,
W74-02596 7B

DWORSHAK RESERVOIR (IDA)
The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

DYE RELEASES
Problems with Colored Papers: Are They a Cause of Pollution, (Probleme mit farbigen Papieren: Sind sie eine Ursache von Verschmutzung),
W74-02255 5B

DYES
Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

DYNAMOMETERS
Analysis of Internal Flow Characteristics of a Smooth-Disk Water-Brake Dynamometer,
W74-02475 8C

EARTHQUAKES
ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

A New Fault Lineament in Southern California,
W74-02570 7B

EASEMENTS
Coleman V. Forister (Suit to Establish Right of Use of Land for Ingress and Egress to Creek Waterfront).
W74-02517 6E

EAST GALLATIN RIVER (MONT.)
Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

EAST GERMANY (MECKLENBURG)
Comparative Productivity Studies of Three Mecklenburg Lakes (Lake Kummerow, Lake Teterow and Lake Malchin), (In German),
W74-02558 2H

ECOLOGICAL DISTRIBUTION
Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

ECOLOGICAL STUDIES
Ecological and Phytosociological Study of a Sector in the Lybian Desert,
W74-02507 2I

ECONOMIC
Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

ECONOMIC EFFICIENCY
Cost Effectiveness of Current Environmental Engineering Practices,
W74-02225 5D

Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

ECONOMIC FEASIBILITY
The Ex Post Measurement of Benefits and Costs in Small Watershed Projects,
W74-02212 6B

Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

Evaluation of the Regional Multipurpose Economic Benefits Resulting From a Water and Related Land Resource Development,
W74-02439 6B

ECONOMIC IMPACT
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

ECONOMICS
River Basin Monetary Authorizations--Disaster Relief Act Amendments.
W74-02516 6E

ECOSYSTEMS
Effects of Highway Bridge Construction on a Subarctic Stream,
W74-02295 4C

EDTA
Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

EFFLUENTS
Characterization of Waste Effluents from a Commercial Pimento Canning Operation,
W74-02379 5A

ELECTRIC POWERPLANTS
Effect of a Cinder Settling Tank of a Thermal Electric Power Plant on the Quality of Subsurface Waters, (In Russian),
W74-02231 5B

ELECTROCHEMISTRY
Hanging Mercury Drop Electrodeposition Technique for Carbon Filament Flameless Atomic Absorption Analysis. Application to the Determination of Copper in Sea Water,
W74-02411 2K

Experimental Study of the Phase-Selective Anodic Stripping Analysis of Micromolar Cadmium (II) at the Micrometer Hanging Mercury Drop Electrode in 0.1 m Potassium Chloride,
W74-02415 2K

ELECTRODES
Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

ELECTRODIALYSIS
Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

ELECTROLYSIS
Method and Apparatus for Electrolytic Treatment of Sewage,
W74-02486 5D

Process for Removal of Contaminants from Wastes,
W74-02487 5D

ELECTROLYTIC CONDUCTIVITY DETECTOR
Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

ELECTRON CAPTURE GAS CHROMATOGRAPHY
The Determination of Methyl Mercury in Urine,
W74-02387 5A

ELUTION
Ion-Exchange Separations on Mixed Columns,
W74-02398 5A

EMINENT DOMAIN
Canyon Public Service District V. Tasa Coal Company (Eminent Domain Proceeding Held Public Service District had Right to Condemn Defendant's Lands for Use in Connection with Sewer Facilities, Defendant Appeals) .
W74-02531 6E

EMULSIFICATION
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

ENDOTHALL
Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

ENDRIN
Agricultural Chemicals in Surface Runoff, Ground Water, and Soil: 1. Endrin,
W74-02152 5B

ENERGY CONVERSION
'Clean Energy Via Coal Gasification',
W74-02462 6B

ENGLISH CHANNEL
Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

ENTROPLICATION
The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

ENVIRONMENT
A Bill to Prescribe Procedures so as to make Administration of the National Environmental Policy Act of 1969 More Effective.
W74-02528 6E

ENVIRONMENTAL CONTROL
(TAPPI) Environmental Conference, May 14-16, 1973.
W74-02273 5D

Environmental Protection Act of 1973, First Session on S.1104.
W74-02518 6E

ENVIRONMENTAL EFFECTS
Effects of Highway Bridge Construction on a Subarctic Stream,
W74-02295 4C

Water Resources Development in the Mullica River Basin,
W74-02450 5C

Proper Time Limitations on Outer Continental Shelf Leases Under The National Environmental Policy Act,
W74-02509 6E

Barta V. Brinegar (Civil Actions Brought Against Federal and State Officials Seeking to Enjoin Construction of Highway Segment Until Completion of Environmental Impact Study).
W74-02521 6E

Environmental Defense Fund, Inc. V. Froehlke (Action Brought for Declaratory Judgment and Injunction Restraining Completion of Reservoir Project).
W74-02524 6E

A Bill to Prescribe Procedures so as to make Administration of the National Environmental Policy Act of 1969 More Effective.
W74-02528 6E

ERTS-1 Investigation of Ecological Effects of Strip Mining in Eastern Ohio,
W74-02572 7B

Studies of the Sinking Plume Phenomenon,
W74-02644 5C

Research Pertinent to Environmental Quality Concerning the Period, 1967-1971.
W74-02648 2L

ENVIRONMENTAL ENGINEERING
Cost Effectiveness of Current Environmental Engineering Practices,
W74-02225 5D

ENVIRONMENTAL IMPACT STATEMENTS
Ogunquit Sand Dune Land Stabilization Measure, York County in Maine, Threshold to Maine Resource Conservation and Development Project (Final Environmental Statement).
W74-02504 4A

ENVIRONMENTAL PROTECTION
Economic Aspects of Environmental Protection (In German),
W74-02227 5G

Hylte Bruk: Newsprint and Environmental Protection, (Hylte Bruk: Zeitungsdruckpapier and Umweltschultz).
W74-02256 5D

Environmental Protection Act of 1973, First Session on S.1104.
W74-02518 6E

ENZYMATIC TECHNIQUES
Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

EPIDERMAL CELLS
Study on the Plasmolysis Time in Epidermal Cells from Leaves of Saxifraga stolonifera Meerb (In Japanese),
W74-02542 2I

EQUATIONS
On Solving the Unsaturated Flow Equation: The Flux-Concentration Relation,
W74-02464 2G

Hyperbolic Stress Equations for Compressible Slabs,
W74-02624 2A

EROSION
Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 2J

A New Oscillating Water Tunnel,
W74-02160 7B

The Relationships Between Land Use and Erosion in the Central North Island, New Zealand
W74-02287 4C

Slope Aspect and Tunnel Erosion in the Lower of Banks Peninsula, New Zealand,
W74-02288 4C

EROSION CONTROL
The Relationships Between Land Use and Erosion in the Central North Island, New Zealand
W74-02287 4C

Prescribed Fire Effects on Water Repellency Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4D

Annual Compilation and Analysis of Hydrologic Data for Little Elm Creek, Trinity River Basin, Texas, 1971,
W74-02477 7C

Annual Compilation and Analysis of Hydrologic Data for Calaveras and Escondido Creeks San Antonio River Basin, Texas, 1971,
W74-02478 7C

Ogunquit Sand Dune Land Stabilization Measure, York County in Maine, Threshold to Maine Resource Conservation and Development Project (Final Environmental Statement)
W74-02504 4A

Soil and Water Conservation Districts.
W74-02537 6E

Annual Compilation and Analysis of Hydrologic Data for Green Creek, Brazos River Basin, Texas, 1971,
W74-02626 4D

ESTIMATED BENEFITS
A Summary Analysis of Nineteen Tests of Proposed Evaluation Procedures on Selected Water and Land Resource Projects.
W74-02188 6B

ESTIMATED COSTS
A Summary Analysis of Nineteen Tests of Proposed Evaluation Procedures on Selected Water and Land Resource Projects.
W74-02188 6B

ESTIMATING
Experience in a Quantitative Assessment of Organization of Snow Cover as a Natural System (Opyt kolichestvennoy otsenki organizatsii snezhnogo pokrova kak prirodnoy sistemy),
W74-02613 2C

ESTUARIES
A Report on Bacterial Pollution Affecting Shellfish Harvesting in Newport River, North Carolina.
W74-02621 5B

Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

Bulletin and Summary of Research Progress Fiscal Years 1970-71.
W74-02647 2L

EUTROPHICATION
An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

EVALUATION
A Summary Analysis of Nineteen Tests of Proposed Evaluation Procedures on Selected Water and Land Resource Projects.
W74-02188 6B

The Demand for and Value of the Sport Fishery on the Au Sable, Jordan, and Red Cedar Rivers,
W74-02204 6B

The Ex Post Measurement of Benefits and Costs in Small Watershed Projects,
W74-02212 6B

Optimum Design Period for Water Pollution Control Plants,
W74-02222 5D

EVAPORATION
Evaporation from Snowdrifts Under Oasis Conditions,
W74-02183 2D

A Study of Items in the Groundwater Balance of Waterlogged Areas (Ob uzuchenii elementov balansa gruntovykh vod no zabolochennykh uchastkakh),
W74-02610 2D

EVAPORATION CONTROL
Comparison of Raingauge Evaporation Suppressants,
W74-02289 2D

EVAPOTRANSPIRATION
The Water Balance of New Zealand,
W74-02291 2A

Water Regime of Solonchak Solonetzes in Open Areas of Forests in the North Caspian Sea Region, (Vodnyy rezhim solonchakovykh solontsov na polyanakh lesnykh nasazhdeniy Severnogo Prikaspiya),
W74-02301 2G

A Study of Items in the Groundwater Balance of Waterlogged Areas (Ob uzuchenii elementov balansa gruntovykh vod no zabolochennykh uchastkakh),
W74-02610 2D

Evapotranspiration and Watershed Research as Related to Riparian and Phreatophyte Management--An Abstract Bibliography.
W74-02630 2D

EXCESSIVE PRECIPITATION
Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

EXPENDITURES
Flood Control Funds -- 1970 Report to the Legislature.
W74-02292 6C

EXPLOITATION
New Concepts in the Law of the Sea,
W74-02497 6E

EXPLORATION
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

Evaluation of Commercial Utility of ERTS-A Imagery in Structural Reconnaissance for Minerals and Petroleum,
W74-02567 7B

FARM WASTES
Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

Two Environmental Analyses Involving Agriculture,
W74-02166 5B

Soil Pollution from Cattle Feedlots in Georgia,
W74-02210 5B

The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

FEASIBILITY STUDIES
Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

FEDERAL
Environmental Defense Fund, Inc. V. Froehlke (Action Brought for Declaratory Judgment and Injunction Restraining Completion of Reservoir Project).
W74-02524 6E

FEDERAL BUDGET
River Basin Monetary Authorizations--Disaster Relief Act Amendments.
W74-02516 6E

FEDERAL-STATE COOPERATION
The Problems and Issues of Implementing the Federal Water Project Recreation Act in the Pacific Northwest,
W74-02453 6C

FEDERAL-STATE WATER RIGHTS CONFLICTS
Legal Developments in Canadian Water Management,
W74-02505 6E

FEED LOTS
Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

Soil Pollution from Cattle Feedlots in Georgia,
W74-02210 5B

FERGANA
Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

FERMENTATION
Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

FERTILIZERS
Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 5B

Anhydrous Ammonia for Field Crops: An Evaluation of Anhydrous Ammonia as a Nitrogen Supply for Cotton, Corn, Rice and Wheat,
W74-02240 3F

Dry Activated Sludge as Fertilizer for Winter Wheat and Corn, (Sukhoi aktivnyi il kak udobrenie dlya posevov ozimi pshenits' i kukuruz'),
W74-02270 5D

Effect of Irrigation, Fertilization, and Other Cultural Practices on Water Quality,
W74-02321 5C

FIBROUS BEDS
Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

FIELD CROPS
Anhydrous Ammonia for Field Crops: An Evaluation of Anhydrous Ammonia as a Nitrogen Supply for Cotton, Corn, Rice and Wheat,
W74-02240 3F

FILMS
Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

FILTERS
Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

FILTRATION
The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

Water-Treatment-Sludge Filtration Studies,
W74-02440 5D

Method for Removing Suspended Solids from Liquids,
W74-02484 5D

FINANCING
Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

FINITE ELEMENT ANALYSIS
Saturated-Unsaturated Seepage by Finite Elements,
W74-02313 2G

FIRTH OF CLYDE
The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

FISH
Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

FISH BREEDING PONDS
The Quantity and Dimensions of Microorganisms in Bottom Sediments of Fish-Breeding Ponds (In Russian),
W74-02228 8I

FISH LAKE VALLEY (NEV. AND CALIF.)
Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

FISH MANAGEMENT
The Problems and Issues of Implementing the Federal Water Project Recreation Act in the Pacific Northwest,
W74-02453 6C

Puget Sound Resident Coho Salmon Study,
W74-02639 2L

FISH MIGRATION
The Hydrology of Ten Streams in Western Washington as Related to the Propagation of Several Pacific Salmon Species,
W74-02297 8I

Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

FISH PHYSIOLOGY
Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

FISH POPULATIONS
Seasonal Variations in the Qualitative and Quantitative Composition of Young Fish Populations in the Varvara Reservoir, (In Russian),
W74-02560 2H

FISH PROCESSING WASTES
Characterization and Treatment of Fish Processing Plant Effluents in Canada,
W74-02262 5D

FISH TUMORS
Frequency of Fish Tumors Found in a Polluted Watershed as Compared to Nonpolluted Canadian Waters,
W74-02401 5C

FISHERIES
The Prospects of Using the Rybinsk Water Storage Basin for Fisheries, (In Russian),
W74-02241 8I

Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

FISHKILL
State of New Jersey, Department of Environmental Protection V. Jersey Central Power and Light Company (Action to Enforce Penalty Provision for Discharge of Harmful Substance into Tidal Waters).
W74-02520 6E

FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY
Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

FLASH DISTILLATION
Multi-Stage Flash Evaporator,
W74-02490 3A

Internally Interconnected Multi-Stage Distillation System,
W74-02496 3A

FLASH FLOODS
Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

FLATHEAD LAKE (MONT)
Description, Distribution, and Ecology of the Rotifer and Crustacean Plankton Communities, Flathead Lake, Montana,
W74-02448 2H

FLOOD CONTROL
Flood Control Funds -- 1970 Report to the Legislature.
W74-02292 6C

A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast.
W74-02324 4B

Flood Control Project Maintenance and Repair--1970 Inspection Report,
W74-02617 2E

FLOOD DATA
Flood of June 1972 at Corning, New York,
W74-02479 7C

Floods at Martinsburg and Vicinity, West Virginia,
W74-02615 2E

FLOOD FORECASTING
New Vistas for Flood Investigations,
W74-02625 2E

FLOOD FREQUENCY
New Vistas for Flood Investigations,
W74-02625 2E

FLOOD MAPPING
Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

Assessment of Flood Damage in Arizona by Means of ERTS-1 Imagery,
W74-02592 7B

FLOOD PLAIN ZONING
Floodplain Mapping and Planning for the 50 and 100 Year Interval Flood Zones of the Bitterroot Valley, Montana,
W74-02215 4A

FLOOD PROTECTION
Annual Compilation and Analysis of Hydrologic Data for Green Creek, Brazos River Basin, Texas, 1971,
W74-02626 4D

FLOOD WAVES
Long Waves in Shallow Triangular Channels,
W74-02158 2E

Dam-Break Flood in a Prismatic Dry Channel,
W74-02311 8B

FLOODING
Camden Special Road District of Ray County V. Taylor, (Action by Special Road District for Mandatory Injunction Compelling Landowners to Remove Levy and to Permanently Enjoin them from Constructing Levy).
W74-02523 6E

FLOODS
Urban Storm Drainage Activities in New York,
W74-02171 4A

Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

Flood of June 1972 at Corning, New York,
W74-02479 7C

Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

Assessment of Flood Damage in Arizona by Means of ERTS-1 Imagery,
W74-02592 7B

Floods at Martinsburg and Vicinity, West Virginia,
W74-02615 2E

New Vistas for Flood Investigations,
W74-02625 2E

FLORIDA
Applicability of the Interceptor Waterway Concept to the Rookery Bay Sanctuary,
W74-02205 4A

Nitrogen, Phosphorus, and Trace Elements in Florida Surface Waters, 1970-71,
W74-02476 5A

Challenges to Federalism: State Legislation Concerning Marine Oil Pollution,
W74-02502 5G

Easements: Judicial and Legislative Protection of the Public's Rights in Florida's Beaches,
W74-02508 6E

City of Hollywood V. Yarborough (Review of Public Service Commission Order Authorizing Utility to Provide Water Service in Unincorporated Area which Petitioner Claimed to have Exclusive Control Over).
W74-02530 6E

Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

Hydrogeologic Aspects of a Proposed Sanitary Landfill Near Old Tampa Bay, Florida,
W74-02628 5E

Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

FLOTATION
Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

FLOTSAM
Water Pollution Control,
W74-02495 5G

FLOW AROUND OBJECTS
Flow in Open Channels With Smooth Curved Boundaries,
W74-02312 8B

FLOW CHARACTERISTICS
Analysis of Internal Flow Characteristics of a Smooth-Disk Water-Brake Dynamometer,
W74-02475 8C

FLOW MEASUREMENT
An Enclosed Weir for Small Streams in Snow Country,
W74-02249 7B

FLOW RATES
Ultrasonic River Flow Measurement,
W74-02250 2E

River Regimes in Iran,
W74-02298 2E

Characterization of Waste Effluents from a Commercial Pimento Canning Operation,
W74-02379 5A

FLOWMETERS
Ultrasonic River Flow Measurement,
W74-02250 2E

FLUID MECHANICS
Analysis of Internal Flow Characteristics of a Smooth-Disk Water-Brake Dynamometer,
W74-02475 8C

FLUORESCENCE
Detection of Pollutants in Water by Raman Spectroscopy,
W74-02164 5A

FLUORIDATION
Sixteen Years of Water Fluoridation in the Netherlands and Its Influence on Dental Decay,
W74-02229 5F

FLUORIDES
Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

FLUORINE
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

FLUORINE CONTENT
Some Regularities of Sr90 Accumulation in the Body of a Rat with a High Fluorine Content in Its Drinking Water, (In Russian),
W74-02195 5C

FLURIDE
Relation of Mineral and Hormone Metabolism to Intake of Water with a High Natural Content of Fluoride,
W74-02235 5C

FOAM SEPARATION
Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

FOAMING
Persistent Sea-Foam Masses -- A Problem Solved,
W74-02180 5B

FOOD CHAINS
Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

FOOD PROCESSING INDUSTRY
Characterization and Treatment of Fish Processing Plant Effluents in Canada,
W74-02262 5D

FOREIGN COUNTRIES
Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

FOREIGN RESEARCH
Shallow Ground Water in the Zamin Dawar Area, Helmand Province, Afghanistan,
W74-02472 4B

FOREST FIRES
Prescribed Fire Effects on Water Repellency, Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4C

FOREST MANAGEMENT
Prescribed Fire Effects on Water Repellency, Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4C

FOREST WATERSHEDS
Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

FORESTS
Influence of the Soil Water Level on Microbial Processes of Pasture and Forest Communities,
W74-02194 2G

Water Regime of Solonchak Solonetzes in Open Areas of Forests in the North Caspian Sea Region, (Vodnyy rezhim solonchakovykh solontsov na polyanakh lesnykh nasazhdeniy Severnogo Prikaspiya),
W74-02301 2G

FORT LOUDOUN RESERVOIR (TENN)
Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

FOSSIL FUELS
Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

FRACTIONATION
Use of Sephadex Gel for the Fractionation of Organic Matter in Lake Water, (In Russian),
W74-02343 5A

FRANCE (VERCORS MASSIVE)
Plant Associations of the Southern Vercors Massive: Associations of Springs and Marshlands at Subalpine Elevation,
W74-02243 2I

FREE SURFACES
Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

Flow in Open Channels With Smooth Curved Boundaries,
W74-02312 8B

FREQUENCY ANALYSIS
Floodplain Mapping and Planning for the 50 and 100 Year Interval Flood Zones of the Bitterroot Valley, Montana,
W74-02215 4A

Probability Analysis in an Approximate Theory of Movement of Water Masses, (Veroyatnostnyy analiz v priblizhennoy teorii peremeshcheniya vodnykh mass),
W74-02305 2E

Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

FRESHWATER FISH
Some Chemical and Biological Characteristics of the Mississippi River Bordering Iowa,
W74-02363 5B

FRUIT CROPS
Survey of Methods of Treating Wine and Grape Waste Water,
W74-02329 5D

FUEL OIL
Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

FUNGOID GROWTH
Occurrence of Saprochaete saccharophyla Coker Et Shanor in Fungoid Growth below the Discharge of Breweries, (In Czech),
W74-02242 5B

FURROW IRRIGATION
Effect of Irrigation, Fertilization, and Other Cultural Practices on Water Quality,
W74-02321 5C

GAGES
Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

GAMMA RADIATION
Calculation of Dose Conversion Factors for 60Co Gamma Radiation in Water, (In German),
W74-02198 5B

GAMMA RAY SPECTROSCOPY
A Pneumatic Sample Changer for Gamma-Ray Spectroscopy,
W74-02407 7B

GAMMA RAYS
An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

GAMMA SPECTROMETRY
Distribution of Caesium-137 in British Coastal Waters,
W74-02365 5B

GAS BUBBLE ELECTRIFICATION
Analysis by Means of Gas Bubble Electrification,
W74-02406 2K

GAS CHROMATOGRAPHY
Analytical Applications of Gas Chromatography of Metal Chelates,
W74-02366 2K

Sampling Techniques in Chromatography,
W74-02372 7B

Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

GAS LIQUID CHROMATOGRAPHY
Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

GASES
'Clean Energy Via Coal Gasification',
W74-02462 6B

Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

GASPE
Structural Lineaments of Gaspe from ERTS Imagery,
W74-02565 7B

GAUSS-ELIMINATION
A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

GENERATION
The Effect of Temperature on the Generation Time of a Bacterial Community in Lake Water,
W74-02557 5B

GEOLOGIC CONTROL
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

GEOLOGIC MAPPING
ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

Recognition of Surface Lithologic and Topographic Patterns in Southwest Colorado with ADP Techniques,
W74-02562 7B

ERTS-1 Imagery as an Aid to the Definition of the Geotectonic Domains of the Southern African Crystalline Shield,
W74-02563 7B

New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

Structural Lineaments of Gaspe from ERTS Imagery,
W74-02565 7B

Lineaments in Coastal Plain Sediments as Seen in ERTS Imagery,
W74-02566 7B

Structural Interpretations Based on ERTS-1 Imagery, Bighorn Region, Wyoming-Montana,
W74-02568 7B

Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

GEOLOGIC TIME
Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

GEOMETRIC PROGRAMMING
Optimization of Industrial Systems with the Separable Programming and the Generalized Reduced Gradient Methods,
W74-02213 5G

GEOMORPHOLOGY
The Importance of Sediment Transport in Water Resources Planning,
W74-02351 4D

Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

GEORGIA
Water and Sewerage Improvements Needed in 1975 in Chatham County, Georgia.
W74-02186 5D

Soil Pollution from Cattle Feedlots in Georgia,
W74-02210 5B

A Water and Sewer Plan: Greene County, Georgia.
W74-02334 5D

A Water and Sewer Plan: Morgan County, Georgia.
W74-02335 5D

A Water and Sewer Plan: Madison County, Georgia.
W74-02336 5D

A Water and Sewer Plan: Walton County, Georgia.
W74-02337 5D

Northeast Georgia Area Water and Sewer Systems Plan and Capital Improvement Program.
W74-02339 3D

Segars V. Cornwell (Property Owner Sues for Malicious Prosecution Against Corporation).
W74-02527 6E

GEOTHERMAL STUDIES
A Hydrogeothermal Description of Groundwater in Upper Cretaceous Deposits in the Southeast Aral Sea Area (Gidrogeotermicheskaya kharakteristika podzemnykh vod verkhnego mela Yugo-Vostochnogo Priaral'ya),
W74-02609 2F

GERMANIUM
Anionic Exchange Separations of the Elements that can be Extracted with Tributyl Phosphate. II, (Anionenaustauschtrennungen der mit Tributylphosphat extrahierbaren Elemente. II),
W74-02432 2K

GERMANY
Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological Institute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

GIBEL
Accumulation of Strontium and Calcium in Freshwater Fishes of Japan,
W74-02197 5C

GLACIER BASIN HYDROLOGY
Combined Heat, Ice and Water Balances at Selected Glacier Basins. Part II: Specifications, Standards and Data Exchange.
W74-02470 2C

GLACIER SURGES
Bear Glacier Has Come Alive (Lednik Medvezhiy ozhil),
W74-02614 2C

GLACIERS
Evaluation of ERTS Imagery for Mapping and Detection of Changes of Snowcover on Land and on Glaciers,
W74-02604 7B

Bear Glacier Has Come Alive (Lednik Medvezhiy ozhil),
W74-02614 2C

GLACIOHYDROLOGY
Combined Heat, Ice and Water Balances at Selected Glacier Basins. Part II: Specifications, Standards and Data Exchange.
W74-02470 2C

GLACIOLOGY
Combined Heat, Ice and Water Balances at Selected Glacier Basins. Part II: Specifications, Standards and Data Exchange.
W74-02470 2C

GOLDSTREAM CREEK (ALASKA)
Effects of Highway Bridge Construction on a Subarctic Stream,
W74-02295 4C

GOUNDWATER POLLUTION SOURCES
Soil Pollution from Cattle Feedlots in Georgia,
W74-02210 5B

GOVERNMENTS
The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

Indices of National Interest in the Oceans,
W74-02499 6E

GRADIENT METHODS
Optimization of Industrial Systems with the Separable Programming and the Generalized Reduced Gradient Methods,
W74-02213 5G

GRAPE WASTE WATER
Survey of Methods of Treating Wine and Grape Waste Water,
W74-02329 5D

GRASSHOPPERS
Grasshoppers and Crickets in the Karshi Steppe, (In Russian),
W74-02239 3F

GRASSLANDS
Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 5B

Detection, Mapping and Estimation of Rate Spread of Grass Fires from Southern African ERTS-1 Imagery,
W74-02576 7B

Preliminary Evaluation of ERTS-1 for Determining Numbers and Distribution of Prairie Ponds and Lakes,
W74-02597 7B

GRAVITATIONAL WATER
Migration of Substances with Surface and Gravitational Waters in Soils of Geochemically Related Landscapes of Baraba, (Migratsiya veshchestv s pverkhnostnymi i gravitatsionnymi vodami v pochvakh geokhimicheski sopryazhennykh landshaftov Baraby),
W74-02300 2G

GRAVITY WAVES
Surface and Internal Waves, (Poverkhnostnyye i vnutrenniye volny),
W74-02299 2E

Design Considerations for a 3-D Laser Doppler Velocimeter for Studying Gravity Waves in Shallow Water,
W74-02642 2L

GREAT LAKES REGION
ERTS-1 Views the Great Lakes,
W74-02602 7B

GREEN COUNTY (GEO)
A Water and Sewer Plan: Greene County, Georgia.
W74-02334 5D

GROUNDWATER
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

Water Resources of Lee County, Mississippi,
W74-02340 4B

Water Quality Management in Groundwater Basins,
W74-02356 5B

Evaluation of Nitrate Content of Ground Water in Hall County, Nebraska,
W74-02465 5B

Selected References, Ground-Water Contamination, The United States of America and Puerto Rico.
W74-02482 5B

Groundwater Pollution in the Western States--Private Remedies and Federal and State Legislation,
W74-02506 5G

Genova V. City of Kansas City (Nuisance Action Brought by Landowner Against City for Damage to Property Allegedly Caused by Flow of Surface Waters from City-Owned Cemetery).
W74-02519 6E

A Hydrogeothermal Description of Groundwater in Upper Cretaceous Deposits in the Southeast Aral Sea Area (Gidrogeotermicheskaya kharakteristika podzemnykh vod verkhnego mela Yugo-Vostochnogo Priaral'ya),
W74-02609 2F

Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

GROUNDWATER AVAILABILITY
Groundwater Exploration and Provision from the Hydrogeological Point of View,
W74-02353 4B

GROUNDWATER BARRIERS
Camden Special Road District of Ray County V. Taylor, (Action by Special Road District for Mandatory Injunction Compelling Landowners to Remove Levy and to Permanently Enjoin them from Constructing Levy).
W74-02523 6E

GROUNDWATER FLOW
A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

GROUNDWATER MINING
Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

GROUNDWATER MOVEMENT
Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

Flow Analysis of Hydraulic Connectors in Artificial Recharge Systems, A Model Study,
W74-02219 4B

Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

Hydrogeologic Aspects of a Proposed Sanitary Landfill Near Old Tampa Bay, Florida,
W74-02628 5E

GROUNDWATER POTENTIAL
A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast.
W74-02324 4B

GROUNDWATER RECHARGE
Flow Analysis of Hydraulic Connectors in Artificial Recharge Systems, A Model Study,
W74-02219 4B

GROUNDWATER RESERVOIRS
The Role of Deformation in Changing the Reservoir Properties of Aquifers,
W74-02446 2F

GROUNDWATER RESOURCES
Groundwater Exploration and Provision from the Hydrogeological Point of View,
W74-02353 4B

Another Rio Grande for New Mexico,
W74-02461 3A

Shallow Ground Water in the Zamin Dawar Area, Helmand Province, Afghanistan,
W74-02472 4B

Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

GROUNDWATER RESOURCES

Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

GROWTH RATES

The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

Growth Rates of Lepomis macrochirus (Centrarchidae) in Three Areas of Lake Texoma,
W74-02422 2H

GUIDES (ILLUSTRATED)

Ciliated Protozoa. An Illustrated Guide to the Species Used as Biological Indicators in Freshwater Biology,
W74-02236 2I

GULF COASTAL PLAIN

General Soils Study: Pearl River, Hancock, Harrison Counties, Mississippi.
W74-02333 2G

GULLY EROSION

Slope Aspect and Tunnel Erosion in the Loess of Banks Peninsula, New Zealand,
W74-02288 2J

HAWAII

Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

HAZARDOUS MATERIALS SPILLS

In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

HEAT BALANCE

Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

HEATED SEWAGE

The Use of Power Plant Heat in a Physical-Chemical Domestic Wastewater Renovation System,
W74-02208 5D

HEATED WATER

Effect of Heated Water from Konakov Hydro-Electric Station on Oxygen Content and Development of Phytoplankton in Ivan'Kovskoe Reservoir During Winter, (In Russian),
W74-02244 5B

HEAVY DISTILLATES

Analyzing Heavy Ends of Crude,
W74-02378 5A

HEAVY METALS

Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

Analytical Applications of Gas Chromatography of Metal Chelates,
W74-02366 2K

Analysis of High-Purity Water by Flameless Atomic-Absorption Spectroscopy. Part II. Signal Integration with a Non-Resonance Line Correction System for Spurious Absorption Phenomena,
W74-02385 5A

Adsorption Characteristics of Silber, Lead, Cadmium, Zinc, and Nickel on Borosilicate Glass, Polyethylene, and Polypropylene Container Surfaces,
W74-02412 5A

The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

The Spreading of Heavy Metals in Flowing Waters in the Region of Occurrence of Natural Deposits and of the Zinc and Lead Industry. (Rozprzestrzenienie metali ciezkich w wodach plynacych w rejonie wystepowania naturalnych zloz oraz przemyslu cynku i olowiu),
W74-02435 5B

Heavy Metals in the Main Streams of the James River Basin, Missouri,
W74-02445 5A

HELMAND PROVINCE (AFHANISTAN)

Shallow Ground Water in the Zamin Dawar Area, Helmand Province, Afghanistan,
W74-02472 4B

HERBICIDES

Experimental and Predicted Movement of Three Herbicides in a Water-Saturated Soil,
W74-02156 5B

Influence of Herbicides on Microbiological Conditions,
W74-02548 5B

HEXACHLOROPHENE

The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

HIGH PLAINS (TEX)

Dynamics of Playa Lakes in the Texas High Plains,
W74-02598 7B

HIGH PURITY WATER

Analysis of High-Purity Water by Flameless Atomic-Absorption Spectroscopy. Part II. Signal Integration with a Non-Resonance Line Correction System for Spurious Absorption Phenomena,
W74-02385 5A

HIGHWAY EFFECTS

Barta V. Brinegar (Civil Actions Brought Against Federal and State Officials Seeking to Enjoin Construction of Highway Segment Until Completion of Environmental Impact Study).
W74-02521 6E

HISTORIC FLOODS

Flood of June 1972 at Corning, New York,
W74-02479 7C

HOLLAND LAKE (MONT)

Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

HOUSTON (TEX)

Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Houston, Texas Metropolitan Area, 1971,
W74-02471 2E

HUMAN POPULATION

Population Projectsions for the New Mexico State Water Plan,
W74-02458 6B

HUMIC ACIDS

Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

HUNGARY (DEBRECEN)

Debrecen Area Inland Waters: Hydrobiological Approach: Influence on Water Quality of Main Eastern Irrigation Canal with Reference to Debrecen's Drinking and Industrial Water Supply,
W74-02543 5C

HYALITE RESERVOIR (MONT)

Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

HYDRAULIC CONNECTORS

Flow Analysis of Hydraulic Connectors in Artificial Recharge Systems, A Model Study,
W74-02219 4B

HYDRAULIC MODELS

A New Oscillating Water Tunnel,
W74-02160 2J

Adjustment of Friction in Hydraulic Models of Lakes,
W74-02314 2H

Analysis of Internal Flow Characteristics of a Smooth-Disk Water-Brake Dynamometer,
W74-02475 8C

HYDRAULIC SIMILITUDE

Adjustment of Friction in Hydraulic Models of Lakes,
W74-02314 2H

HYDRO ELECTRIC POWERPLANT

Effect of Heated Water from Konakov Hydro-Electric Station on Oxygen Content and Development of Phytoplankton in Ivan'Kovskoe Reservoir During Winter, (In Russian),
W74-02244 5B

HYDROGEN SULFIDE

The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

HYDROGEOLOGY
The Role of Deformation in Changing the Reservoir Properties of Aquifers,
W74-02446 2F

Shallow Ground Water in the Zamin Dawar Area, Helmand Province, Afghanistan,
W74-02472 4B

Hydrogeologic Aspects of a Proposed Sanitary Landfill Near Old Tampa Bay, Florida,
W74-02628 5E

HYDROLOGIC CYCLE
Water-Balance Method and Its Practical Importance, (Metod vodnogo balansa i yego prakticheskoye znacheniye),
W74-02308 2A

HYDROLOGIC DATA
Mapping Average Annual Surface Water Resources of the Hydrological Regions of Nelson, New Zealand,
W74-02290 2E

River Regimes in Iran,
W74-02298 2E

Use of Digital Computer Techniques in Water Resources Data Storage,
W74-02357 4B

Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Houston, Texas Metropolitan Area, 1971,
W74-02471 2E

California High Water, 1970-1971,
W74-02474 2E

Annual Compilation and Analysis of Hydrologic Data for Little Elm Creek, Trinity River Basin, Texas, 1971,
W74-02477 2E

Annual Compilation and Analysis of Hydrologic Data for Calaveras and Escondido Creeks, San Antonio River Basin, Texas, 1971,
W74-02478 2E

Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

Annual Compilation and Analysis of Hydrologic Data for Green Creek, Brazos River Basin, Texas, 1971,
W74-02626 4D

HYDROLOGIC MODELS
Flow Analysis of Hydraulic Connectors in Artificial Recharge Systems, A Model Study,
W74-02219 4B

HYDROLOGY
Bolinas Lagoon, Marin County, California, Summary of Sedimentation and Hydrology, 1967-69,
W74-02296 2L

HYDROLYSIS
Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

HYGIENIC CONDITIONS
Hygienic Conditions in the Procurement of Drinking Water from Individual Sources (In German),
W74-02547 5B

HYGROMETRY
Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

HYPOCHLORITES
Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

ICE
Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

IDAHO
Effect of Irrigation, Fertilization, and Other Cultural Practices on Water Quality,
W74-02321 5C

Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

Evaluation of the Regional Multipurpose Economic Benefits Resulting From a Water and Related Land Resource Development,
W74-02439 6B

The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

Salmon Falls Division, Upper Snake River Project, Idaho, Part 11.
W74-02515 6E

ILLINOIS
A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

Public Water Supplies--Chlorination.
W74-02538 5G

Public Water Supplies.
W74-02539 5G

ILLINOIS (FOX RIVER)
Frequency of Fish Tumors Found in a Polluted Watershed as Compared to Nonpolluted Canadian Waters,
W74-02401 5C

INDIA (DEHRA DUN VALLEY)
The Phenology of Dragonflies in the Dehra Dun Valley, India,
W74-02237 2I

INDIAN RESERVATIONS
Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

INDIANA
Regional Water, Sewage, and Solid Waste Districts.
W74-02535 5D

Levees and Drains--Change of Water-Courses.
W74-02536 6E

INDICATORS (BIOLOGICAL)
Ciliated Protozoa. An Illustrated Guide to the Species Used as Biological Indicators in Freshwater Biology,
W74-02236 2I

INDUSTRIAL WASTES
Hylte Bruk: Newsprint and Environmental Protection, (Hylte Bruk: Zeitungsdruckpapier and Umweltschultz).
W74-02256 5D

Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological Institute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

Characterization and Treatment of Fish Processing Plant Effluents in Canada,
W74-02262 5D

Effluent Treatment at Man-Made Fibre Production Units,
W74-02263 5D

Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

(TAPPI) Environmental Conference, May 14-16, 1973.
W74-02273 5D

Advanced Practical Water Recycle in Tissue Manufacture,
W74-02279 5D

Survey of Methods of Treating Wine and Grape Waste Water,
W74-02329 5D

The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

INDUSTRIAL WASTES

U.S. V. American Cyanamid Company (Action for Discharge into Navigable Waterways).
W74-02522 6E

INDUSTRIAL WATER

Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

Debrecen Area Inland Waters: Hydrobiological Approach: Influence on Water Quality of Main Eastern Irrigation Canal with Reference to Debrecen's Drinking and Industrial Water Supply,
W74-02543 5C

INDUSTRIAL WATERS

Manufacture of Capacitor Paper -- Some Problems with Fresh Water Preparation, (Erzeugung von Kondensatorpapier -- einige Probleme bei der Frischwasserherstellung),
W74-02247 5D

INDUSTRIES

Optimization of Industrial Systems with the Separable Programming and the Generalized Reduced Gradient Methods,
W74-02213 5G

INFORMATION EXCHANGE

State Water Plan, Proceedings of 18th Annual New Mexico Water Conference.
W74-02456 6B

INFRARED ABSORPTION

A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

INFRARED RADIATION

Optical Constants of Water in the 200-nm to 200-Micrometer Wavelength Region,
W74-02167 2K

INFRARED SPECTRA

Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

INJECTION WELLS

Determination of the Mechanical Compatibility of Porous Rocks with Waste Water in its Subsurface Disposal,
W74-02165 5B

INORGANIC SOLVENTS

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

INSECT TRAPS

A New Aquatic Insect Trap,
W74-02551 7B

INSECTS

Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

INSTRUMENTATION

A Shear Plate for Use in Oscillatory Flow,
W74-02161 2E

Ultrasonic River Flow Measurement,
W74-02250 2E

Printout Colorimeter for Autoanalysis of Water Pollution,
W74-02374 5A

A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

A Pneumatic Sample Changer for Gamma-Ray Spectroscopy,
W74-02407 7B

Design Considerations for a 3-D Laser Doppler Velocimeter for Studying Gravity Waves in Shallow Water,
W74-02642 2L

INTER-BASIN TRANSFERS

Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

INTERCEPTOR WATERWAYS

Applicability of the Interceptor Waterway Concept to the Rookery Bay Sanctuary,
W74-02205 4A

INTERNAL WAVES

Surface and Internal Waves, (Poverkhnostnyye i vnutrenniye volny),
W74-02299 2E

INTERNATIONAL HYDROLOGICAL DECADE

Combined Heat, Ice and Water Balances at Selected Glacier Basins. Part II: Specifications, Standards and Data Exchange.
W74-02470 2C

INTERNATIONAL LAW

New Concepts in the Law of the Sea,
W74-02497 6E

Scientific Aspects of Maritime Sovereignty Claims,
W74-02498 6E

Indices of National Interest in the Oceans,
W74-02499 6E

Ocean Science and Mutual Assistance: An Uneasy Alliance,
W74-02500 6E

Development of the Freedom of Scientific Research Issue of the Third Law of the Sea Conference,
W74-02501 6E

INTRACELLULAR WATER

Study of the Intracellular Water State in Plants Under the Effect of Phenols, (In Russian),
W74-02234 2I

INVERTEBRATES

An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

ION EXCHANGE

Manufacture of Capacitor Paper -- Some Problems with Fresh Water Preparation, (Erzeugung von Kondensatorpapier -- einige Probleme bei der Frischwasserherstellung),
W74-02247 5D

Sodium Recovery from a Pulp Mill Waste Effluent by Ion Exchange,
W74-02259 5D

Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

ION EXCHANGE CHROMATOGRAPHY

Ion-Exchange Separations on Mixed Columns,
W74-02398 5A

Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

ION UPTAKE (PLANTS) *MAIZE

The Action of Abscisic Acid on Ion Uptake and Water Flow in Plant Roots,
W74-02260 3F

IONIC INTERFERENCE

Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

IONS

Adsorption Characteristics of Silber, Lead, Cadmium, Zinc, and Nickel on Borosilicate Glass, Polyethylene, and Polypropylene Container Surfaces,
W74-02412 5A

Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

IRAN

River Regimes in Iran,
W74-02298 2E

IRAQ (LOWER MESOPOTAMIAN VALLEY)

The Balance of Surface Water Resources in the Lower Mesopotamian Valley,
W74-02350 6B

IRON

Iron, Zinc, Magnesium, and Copper Concentrations in Body Meat of the Blue Crab, Callinectes sapidus,
W74-02409 5A

IRON COMPOUNDS

Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

IRRIGATION

Salmon Falls Division, Upper Snake River Project, Idaho, Part 11.
W74-02515 6E

A Bill to Authorize the Secretary of the Interio to Construct, Operate, and Maintain the Pol lock-Herreid Unit, South Dakota Pumpin Division, Missouri River Basin Project, Sout Dakota.
W74-02529 6E

Legal and Institutional Constraints in Con solidating Irrigation Systems,
W74-02533 3I

IRRIGATION CANALS

Debrecen Area Inland Waters: Hydrobiologica Approach: Influence on Water Quality of Mai

Eastern Irrigation Canal with Reference to Debrecen's Drinking and Industrial Water Supply,
W74-02543 5C

IRRIGATION EFFECTS
Trickle Irrigation on Cotton,
W74-02347 3F

IRRIGATION PROGRAMS
Evaluation of the Regional Multipurpose Economic Benefits Resulting From a Water and Related Land Resource Development,
W74-02439 6B

IRRIGATION SYSTEMS
Trickle Irrigation on Cotton,
W74-02347 3F

Legal and Institutional Constraints in Consolidating Irrigation Systems,
W74-02533 3F

IRRIGATION WATER
Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

ISE BAY (JAPAN)
Red Tide in Ise Bay,
W74-02587 7B

ISOLATION
Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

ISOPRENOIDS
Chemistry of Marine Natural Products,
W74-02189 5B

ISOTOPE STUDIES
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

ISRAEL
Use of Systems Approaches in Planning Israel's Water Resources Management,
W74-02352 6A

ISRAEL (HULA VALLEY)
Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

JAMES RIVER (MO.)
Heavy Metals in the Main Streams of the James River Basin, Missouri,
W74-02445 5A

JAPAN
On Mallomonas lelymeme Harris Et Bradley (Chrysophyceae), (In Japanese),
W74-02550 2H

JAPAN (HOKURIKU)
On the Relation Between the Occurrence of Desmids and the Salinity in the Hokuriku District of Japan, (In Japanese).
W74-02191 5B

JAPAN (KITAKAMI RIVER)
On the Characteristics of Salt Intrusion in the Kitakami River, Miyagi Prefecture (In Japanese),
W74-02541 5B

JAPAN (LAKE SAIZUCHI-NUMA)
Some Limnological Remarks on Lake Saizuchi-Numa, Yamagata Prefecture, (In Japanese),
W74-02207 5C

JUDICIAL DECISIONS
In RE Chinese Maritime Trust, Ltd., (Wreck Obstructing Navigable Waters of the Panama Canal).
W74-02513 6E

Coleman V. Forister (Suit to Establish Right of Use of Land for Ingress and Egress to Creek Waterfront).
W74-02517 6E

Genova V. City of Kansas City (Nuisance Action Brought by Landowner Against City for Damage to Property Allegedly Caused by Flow of Surface Waters from City-Owned Cemetery).
W74-02519 6E

State of New Jersey, Department of Environmental Protection V. Jersey Central Power and Light Company (Action to Enforce Penalty Provision for Discharge of Harmful Substance into Tidal Waters).
W74-02520 6E

Barta V. Brinegar (Civil Actions Brought Against Federal and State Officials Seeking to Enjoin Construction of Highway Segment Until Completion of Environmental Impact Study).
W74-02521 6E

U.S. V. American Cyanamid Company (Action for Discharge into Navigable Waterways).
W74-02522 6E

Camden Special Road District of Ray County V. Taylor, (Action by Special Road District for Mandatory Injunction Compelling Landowners to Remove Levy and to Permanently Enjoin them from Constructing Levy).
W74-02523 6E

Environmental Defense Fund, Inc. V. Froehlke (Action Brought for Declaratory Judgment and Injunction Restraining Completion of Reservoir Project).
W74-02524 6E

State V. Placid Oil Company (Action by State to Establish Its Ownership of Submerged Lands).
W74-02534 6E

JURISDICTION
Scientific Aspects of Maritime Sovereignty Claims,
W74-02498 6E

Indices of National Interest in the Oceans,
W74-02499 6E

Ocean Science and Mutual Assistance: An Uneasy Alliance,
W74-02500 6E

KANSAS
Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

KARST
Aerial Remote Sensing of Carbonate Terranes in Shelby County, Alabama,
W74-02467 7B

KENTUCKY
Calibrating A Water Yield Model for Small Ungaged Watersheds,
W74-02172 2A

LAGOONS
Bolinas Lagoon, Marin County, California, Summary of Sedimentation and Hydrology, 1967-69,
W74-02296 2L

LAKE BASINS
Water-Balance Method and Its Practical Importance, (Metod vodnogo balansa i yego prakticheskoye znacheniye),
W74-02308 2A

LAKE BEDS
Yoffe V. Special Board, Chapter 387, (State Denial of License to Exploit Natural Resources of a Lake Bed).
W74-02514 6E

LAKE CHAMPLAIN
Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

LAKE CHAUTAUQUA (N.Y.)
Persistent Sea-Foam Masses -- A Problem Solved,
W74-02180 5B

Surface Quality Assessment of Natural Bodies of Water,
W74-02181 5A

Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

LAKE ICE
Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

LAKE MICHIGAN
Studies of the Sinking Plume Phenomenon,
W74-02644 5C

Sedimentation and Scour Off Nuclear Power Plants,
W74-02645 2J

LAKE OAHE (SO. DAK)
Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

LAKE ONTARIO
Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

Progress of an ERTS-1 Program for Lake Ontario and its Basin,
W74-02600 7B

LAKE ONTARIO

Remote Sensing of Turbidity Plumes in Lake Ontario,
W74-02601 7B

LAKE ONTARIO BASIN
Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

Progress of an ERTS-1 Program for Lake Ontario and its Basin,
W74-02600 7B

LAKE SEDIMENTS
Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

LAKE STRATIFICATION
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

Some Limnological Remarks on Lake Saizuchi-Numa, Yamagata Prefecture, (In Japanese),
W74-02207 5C

LAKE TAHOE (CALIF-NEV)
Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

LAKE TEXOMA (TEX-OKLA)
Growth Rates of Lepomis macrochirus (Centrarchidae) in Three Areas of Lake Texoma,
W74-02422 2H

LAKES
Dynamics of Playa Lakes in the Texas High Plains,
W74-02598 7B

Bear Glacier Has Come Alive (Lednik Medvezhiy ozhil),
W74-02614 2C

LAND CLASSIFICATION
Guide to Improvement of Arizona Rangeland.
W74-02349 4A

Guidelines for the Coastal Zone.
W74-02510 2L

LAND DEVELOPMENT
Evaluation of the Regional Multipurpose Economic Benefits Resulting From a Water and Related Land Resource Development,
W74-02439 6B

Ogunquit Sand Dune Land Stabilization Measure, York County in Maine, Threshold to Maine Resource Conservation and Development Project (Final Environmental Statement).
W74-02504 4A

Segars V. Cornwell (Property Owner Sues for Malicious Prosecution Against Corporation).
W74-02527 6E

Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

LAND MANAGEMENT
Ogunquit Sand Dune Land Stabilization Measure, York County in Maine, Threshold to Maine Resource Conservation and Development Project (Final Environmental Statement).
W74-02504 4A

LAND SUBSIDENCE
Aerial Remote Sensing of Carbonate Terranes in Shelby County, Alabama,
W74-02467 7B

LAND USE
Applicability of the Interceptor Waterway Concept to the Rookery Bay Sanctuary,
W74-02205 4A

The Relationships Between Land Use and Erosion in the Central North Island, New Zealand,
W74-02287 4D

Guide to Improvement of Arizona Rangeland.
W74-02349 4A

Wetland Fill-Restrictions Do Not Constitute a Compensable 'Taking' Within the Meaning of the Fifth Amendment,
W74-02503 4A

Ogunquit Sand Dune Land Stabilization Measure, York County in Maine, Threshold to Maine Resource Conservation and Development Project (Final Environmental Statement).
W74-02504 4A

Guidelines for the Coastal Zone.
W74-02510 2L

Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

LANDFILLS
Hydrogeologic Aspects of a Proposed Sanitary Landfill Near Old Tampa Bay, Florida,
W74-02628 5E

LANDSCAPING
A Study of Water Used on Urban Landscapes,
W74-02459 6B

LASER DOPPLER VELOCIMETER
Design Considerations for a 3-D Laser Doppler Velocimeter for Studying Gravity Waves in Shallow Water,
W74-02642 2L

LAW OF THE SEA
New Concepts in the Law of the Sea,
W74-02497 6E

LAWNS
A Study of Water Used on Urban Landscapes,
W74-02459 6B

LEACHING
Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

The Effects of Trace Metals on Ground Water Quality as Influenced by Soils Reflecting Differences in Organic Matter Content and Genetic Conditions,
W74-02211 5B

LEAD
Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

Heavy Metals in the Main Streams of the James River Basin, Missouri,
W74-02445 5A

LEGAL ASPECTS
Ocean Science and Mutual Assistance: An Uneasy Alliance,
W74-02500 6E

Easements: Judicial and Legislative Protection of the Public's Rights in Florida's Beaches,
W74-02508 6E

Public Access to Beaches: Common Law Doctrines and Constitutional Challenges.
W74-02512 6E

LEGAL REVIEW
Legal Developments in Canadian Water Management,
W74-02505 6E

Yoffe V. Special Board, Chapter 387, (State Denial of License to Exploit Natural Resources of a Lake Bed).
W74-02514 6E

LEGISLATION
Challenges to Federalism: State Legislation Concerning Marine Oil Pollution,
W74-02502 5G

Legal Developments in Canadian Water Management,
W74-02505 6E

Proper Time Limitations on Outer Continental Shelf Leases Under The National Environmental Policy Act,
W74-02509 6E

Salmon Falls Division, Upper Snake River Project, Idaho, Part 11.
W74-02515 6E

River Basin Monetary Authorizations--Disaster Relief Act Amendments.
W74-02516 6E

Environmental Protection Act of 1973, First Session on S.1104.
W74-02518 6E

Barta V. Brinegar (Civil Actions Brought Against Federal and State Officials Seeking to Enjoin Construction of Highway Segment Until Completion of Environmental Impact Study).
W74-02521 6E

A Bill to Prescribe Procedures so as to make Administration of the National Environmental Policy Act of 1969 More Effective.
W74-02528 6E

Regional Water, Sewage, and Solid Waste Districts.
W74-02535 5D

Soil and Water Conservation Districts.
W74-02537 6E

Submerged Lands.
W74-02540 6E

LEVEES
Levees and Drains--Change of Water-Courses.
W74-02536 6E

Flood Control Project Maintenance and Repair--1970 Inspection Report,
W74-02617 2E

LIBIAN DESERT
Ecological and Phytosociological Study of a Sector in the Lybian Desert,
W74-02507 2I

LIGNINS
Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

LIGNOSULFONIC ACIDS
Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

LIME
Color Removal from Kraft Pulp Mill Effluents by Massive Lime Treatment,
W74-02284 5D

LIME-SOFTENING SLUDGE
Water-Treatment-Sludge Filtration Studies,
W74-02440 5D

LINE SUCCESSIVE OVER RELAXATION
A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

LINEAR PROGRAMMING
Two Environmental Analyses Involving Agriculture,
W74-02166 5B

Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

LIPIDS
Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

LIQUID WASTES
The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

LITTORAL DRIFT
Research in the Coastal and Oceanic Environment,
W74-02481 2L

LOANS
Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

LOESS
Slope Aspect and Tunnel Erosion in the Loess of Banks Peninsula, New Zealand,
W74-02288 2J

LONG-TERM PLANNING
Optimum Design Period for Water Pollution Control Plants,
W74-02222 5D

LONGTERM PLANNING
A Bayesian Decision Framework for Synthetic Hydrology,
W74-02438 6A

LOUISIANA
State V. Placid Oil Company (Action by State to Establish Its Ownership of Submerged Lands).
W74-02534 6E

LUBBOCK (TEXAS)
Metropolitan Water and Sewer Plan, Lubbock Metropolitan Council of Governments.
W74-02331 3D

LYSIMETERS
A Study of Items in the Groundwater Balance of Waterlogged Areas (Ob uzuchenii elementov balansa gruntovykh vod no zabolochennykh uchastkakh),
W74-02610 2D

MACROPHYTES
An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

MADAGASCAR (LAKE ITASY-LAKE MANTOSA)
Comparative Biology of Tilapia rendalli (Boulenger) (Pisces cichlidae) in Lake Itasy and Lake Mantasoa, (In French),
W74-02344 2H

MADISON COUNTY (GEO)
A Water and Sewer Plan: Madison County, Georgia.
W74-02336 5D

MAGNESIUM
Iron, Zinc, Magnesium, and Copper Concentrations in Body Meat of the Blue Crab, Callinectes sapidus,
W74-02409 5A

MAINE
Ogunquit Sand Dune Land Stabilization Measure, York County in Maine, Threshold to Maine Resource Conservation and Development Project (Final Environmental Statement).
W74-02504 4A

State of Maine V. M/V Tamano (Suit to Recover Damages Incurred as Result of Discharge into Waters of Bay).
W74-02525 6E

MAIZE GROWTH
The Effect of Soil Moisture Upon the Availability of Potassium and its Influence on the Growth of Young Maize Plants (Zea mays L.),
W74-02554 3F

MANAGUA (NICARAGUA)
ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

MANGANESE
Factors Affecting the Manganese Status in Soils of the U.A.R.,
W74-02200 2G

MAPPING
Floodplain Mapping and Planning for the 50 and 100 Year Interval Flood Zones of the Bitterroot Valley, Montana,
W74-02215 4A

Mapping Average Annual Surface Water Resources of the Hydrological Regions of Nelson, New Zealand,
W74-02290 2E

Application and Consequences of Precipitation Observations in the Republic of Sudan in View of the Nomadic Life and Economy,
W74-02348 2B

ERTS-1 Investigation of Ecological Effects of Strip Mining in Eastern Ohio,
W74-02572 7B

The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

Use of the Sri Electronic Satellite Image Analysis Console for Mapping Southern Arizona Plant Communities from ERTS-1 Imagery,
W74-02593 7B

MARICULTURE
Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

MARINE ENVIRONMENT
Chemistry of Marine Natural Products,
W74-02189 5B

MARINE FISH
The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

MARKOV PROCESSES
Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

MARSH MANAGEMENT
Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

MARSH PLANTS
Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

MARSHLANDS
Plant Associations of the Southern Vercors Massive: Associations of Springs and Marshlands at Subalpine Elevation,
W74-02243 2I

Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

MARTINSBURG AREA (W VA)
Floods at Martinsburg and Vicinity, West Virginia,
W74-02615 2E

MASS SPECTROMETRY
The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

Potentiality of the Coupling of Column Liquid Chromatography and Field Desorption Mass Spectrometry,
W74-02430 2K

MASSACHUSETTS
A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast.
W74-02324 4B

Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

MATHEMATICAL MODELS
System 21, 'Jupiter' (A Design System for Two-Dimensional Nearly-Horizontal Flows),
W74-02159 7C

Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

Elevation Dependent Model for Estimating Annual Runoff,
W74-02317 2A

Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

Hymo: Problem-Oriented Computer Language for Hydrologic Modeling--Users Manual,
W74-02469 2A

Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

MATHEMATICAL STUDIES
New Vistas for Flood Investigations,
W74-02625 2E

MEANDERS
Detection of Major River Bed Changes in the River Ebro (North-Eastern Spain),
W74-02589 7B

MEASUREMENT
Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

Salinity Corrections for Dissolved Oxygen Measurements,
W74-02424 5A

MEASUREMENTS
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

MEKONG DELTA
Applications of Multispectral Imagery to Water Resources Development Planning in the Lower Mekong Basin (Khemer Republic, Laos, Thailand and Viet-Nam),
W74-02590 7B

MELTING
Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

MEMBRANES
Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

MERCURY
Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

Uptake of Mercury by Fish in Natural and Artificial Systems,
W74-02460 5B

METABOLISM (HUMAN)
Relation of Mineral and Hormone Metabolism to Intake of Water with a High Natural Content of Fluoride,
W74-02235 5C

METAL COMPLEXES
Nuclear Magnetic Resonance Relaxation Titration,
W74-02402 2K

Selection of Experimental Conditions for the Photometric Complex Formation Titrations of Metals in the PPM-Range,
W74-02404 5A

Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

METAL DITHIZONATES
Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

METALS
The Effects of Trace Metals on Ground Water Quality as Influenced by Soils Reflecting Differences in Organic Matter Content and Genetic Conditions,
W74-02211 5B

Selection of Experimental Conditions for the Photometric Complex Formation Titrations of Metals in the PPM-Range,
W74-02404 5A

Process for Removal of Contaminants from Wastes,
W74-02487 5D

METEOROLOGY
ERTS-1 Views the Great Lakes,
W74-02602 7B

Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

METHODOLOGY
A Summary Analysis of Nineteen Tests of Proposed Evaluation Procedures on Selected Water and Land Resource Projects.
W74-02188 6B

Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

Analyzing Heavy Ends of Crude,
W74-02378 5A

The Determination of Methyl Mercury in Urine,
W74-02387 5A

Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

METHYLMERCURY
The Determination of Methyl Mercury in Urine,
W74-02387 5A

METHYLMERCURY COMPOUNDS
Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

METROPOLITAN STUDIES
Metropolitan Water and Sewer Plan, Lubbock Metropolitan Council of Governments.
W74-02331 3D

MEXICO (SONORA)
Water Quality Management in Groundwater Basins,
W74-02356 5B

The Use of Desalted Seawater for Intensive Agricultural Applications, (El Uso de Agua de Mar Desalada Para Intensivas Aplicaciones Agricolas),
W74-02359 3A

MICHIGAN
An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

User Related Study of Three Michigan Rivers,
W74-02202 6B

Economic Evaluation of the Sport Fishery of the Au Sable River, Michigan,
W74-02203 6B

The Demand for and Value of the Sport Fishery on the Au Sable, Jordan, and Red Cedar Rivers,
W74-02204 6B

Michigan State Water Pollution Control Plan.
W74-02511 5G

MICROBIAL DEGRADATION
Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

MICROBIAL PROCESSES (SOIL)
Influence of the Soil Water Level on Microbial Processes of Pasture and Forest Communities,
W74-02194 2G

MICROBIOLOGY
Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

MICROORGANISMS
The Quantity and Dimensions of Microorganisms in Bottom Sediments of Fish-Breeding Ponds (In Russian),
W74-02228 8I

Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

MIGRATION
Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

Puget Sound Resident Coho Salmon Study,
W74-02639 2L

MILK
Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

MINE WASTES
The Spreading of Heavy Metals in Flowing Waters in the Region of Occurrence of Natural Deposits and of the Zinc and Lead Industry. (Rozprzestrzenienie metali ciezkich w wodach plynacych w rejonie wystepowania naturalnych zloz oraz przemyslu cynku i olowiu),
W74-02435 5B

Monitoring Vegetation Cover on Mine Dumps with ERTS-1 Imagery: Some Initial Results,
W74-02574 7B

MINE WATER
The Spreading of Heavy Metals in Flowing Waters in the Region of Occurrence of Natural Deposits and of the Zinc and Lead Industry. (Rozprzestrzenienie metali ciezkich w wodach plynacych w rejonie wystepowania naturalnych zloz oraz przemyslu cynku i olowiu),
W74-02435 5B

MINERALIZATION
The Ability of Bacteria to Mineralize Algae Organic Matter, (In Russian),
W74-02252 5B

MINING
Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

Monitoring Vegetation Cover on Mine Dumps with ERTS-1 Imagery: Some Initial Results,
W74-02574 7B

MISSISSIPPI
Tombigbee River Valley Water Management District, Tenth Annual Report.
W74-02332 6B

General Soils Study: Pearl River, Hancock, Harrison Counties, Mississippi.
W74-02333 2G

Water Resources of Lee County, Mississippi,
W74-02340 4B

MISSISSIPPI RIVER
Some Chemical and Biological Characteristics of the Mississippi River Bordering Iowa,
W74-02363 5B

MISSISSIPPI SOUND
Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

MISSOURI
Heavy Metals in the Main Streams of the James River Basin, Missouri,
W74-02445 5A

Genova V. City of Kansas City (Nuisance Action Brought by Landowner Against City for Damage to Property Allegedly Caused by Flow of Surface Waters from City-Owned Cemetery).
W74-02519 6E

Camden Special Road District of Ray County V. Taylor, (Action by Special Road District for Mandatory Injunction Compelling Landowners to Remove Levy and to Permanently Enjoin them from Constructing Levy).
W74-02523 6E

MIXED STANDARDS
The Use and Effect of Mixed Standards on the Quantitation of Polychlorinated Biphenyls,
W74-02393 5A

MIXING
The Turbulent Temperature Mixing Layer,
W74-02162 8B

Field Tests on Transverse Mixing in Rivers,
W74-02318 5B

MODEL STUDIES
Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

Use of Systems Approaches in Planning Israel's Water Resources Management,
W74-02352 6A

MOISTURE CONTENT
Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

MOISTURE METERS
Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

MOISTURE POTENTIAL
Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

MOLLUSCICIDAL TREATMENT
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Tritylmorpholine Association (In French),
W74-02226 5C

MOLLUSK CONTROL
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Tritylmorpholine Association (In French),
W74-02226 5C

MOLLUSKS
Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

MONITORING
System for Monitoring Contaminants in Liquids,
W74-02493 5A

Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

Monitoring Ocean Dumping with ERTS-1 Data,
W74-02580 7B

Polluted and Turbid Water Masses in Osaka Bay and Its Vicinity Revealed with ERTS-A Imageries,
W74-02586 7B

Detection of Major River Bed Changes in the River Ebro (North-Eastern Spain),
W74-02589 7B

MONTANA
Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

MONTANA

Floodplain Mapping and Planning for the 50 and 100 Year Interval Flood Zones of the Bitterroot Valley, Montana,
W74-02215 4A

The Role of Deformation in Changing the Reservoir Properties of Aquifers,
W74-02446 2F

Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

MONTE CARLO METHODS
A Bayesian Decision Framework for Synthetic Hydrology,
W74-02438 6A

MORGAN COUNTY (GEO)
A Water and Sewer Plan: Morgan County, Georgia.
W74-02335 5D

MOVEMENT
Bear Glacier Has Come Alive (Lednik Medvezhiy ozhil),
W74-02614 2C

MULLICA RIVER BASIN (NJ)
Water Resources Development in the Mullica River Basin,
W74-02450 5C

MULTI-PURPOSE PROJECTS
Evaluation of the Regional Multipurpose Economic Benefits Resulting From a Water and Related Land Resource Development,
W74-02439 6B

MULTIPLE PURPOSE
Evolving Water Policy and Management in the United States,
W74-02358 6B

MULTIPLE-PURPOSE PROJECTS
A Summary Analysis of Nineteen Tests of Proposed Evaluation Procedures on Selected Water and Land Resource Projects.
W74-02188 6B

MUNICIPAL WASTES
United States V. Lindsay (Government's Action Against City for Alleged Violation of Refuse Act and New York Harbor Act, and for Creation of Public Nuisance).
W74-02526 6E

MUNICIPAL WATER
Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

NAPLES (FLA)
Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

NATIONAL WATER COMMISSION
Report by the National Water Commission--A Review,
W74-02463 6B

NATURAL GAS
'Clean Energy Via Coal Gasification',
W74-02462 6B

NATURAL ORGANICS
Chemistry of Marine Natural Products,
W74-02189 5B

NATURAL RESOURCES
Legal Developments in Canadian Water Management,
W74-02505 6E

NATURAL WATERS
Comparing the Quality of Our Waters,
W74-02428 5A

NAVIGABLE WATER
In RE Chinese Maritime Trust, Ltd., (Wreck Obstructing Navigable Waters of the Panama Canal).
W74-02513 6E

NAVIGATION
In RE Chinese Maritime Trust, Ltd., (Wreck Obstructing Navigable Waters of the Panama Canal).
W74-02513 6E

NEARSHORE PROCESSES
An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

NEBRASKA
A Study of Factors Influencing the Nitrogen and Phosphorus Contents of Nebraska Waters,
W74-02151 5B

Evaluation of Nitrate Content of Ground Water in Hall County, Nebraska,
W74-02465 5B

NEPONSET RIVER BASIN (MASS.)
Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

NETHERLANDS
Sixteen Years of Water Fluoridation in the Netherlands and Its Influence on Dental Decay,
W74-02229 5F

NEUTRON ACTIVATION ANALYSIS
A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

NEVADA
Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

NEW BRAUNFELS (TEX)
Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

NEW HAMPSHIRE
Regional Wastewater Facilities Study.
W74-02338 5D

Yoffe V. Special Board, Chapter 387, (State Denial of License to Exploit Natural Resources of a Lake Bed).
W74-02514 6E

NEW JERSEY
Water Resources Development in the Mullica River Basin,
W74-02450 5C

State of New Jersey, Department of Environmental Protection V. Jersey Central Power and Light Company (Action to Enforce Penalty Provision for Discharge of Harmful Substance into Tidal Waters).
W74-02520 6E

NEW MEXICO
State Water Plan, Proceedings of 18th Annual New Mexico Water Conference.
W74-02456 6B

State Water Plan,
W74-02457 6B

Population Projectsions for the New Mexico State Water Plan,
W74-02458 6B

A Study of Water Used on Urban Landscapes,
W74-02459 6B

Uptake of Mercury by Fish in Natural and Artificial Systems,
W74-02460 5B

Another Rio Grande for New Mexico,
W74-02461 3A

'Clean Energy Via Coal Gasification',
W74-02462 6B

NEW YORK
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

Persistent Sea-Foam Masses -- A Problem Solved,
W74-02180 5B

Surface Quality Assessment of Natural Bodies of Water,
W74-02181 5A

Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

Flood of June 1972 at Corning, New York,
W74-02479 7C

United States V. Lindsay (Government's Action Against City for Alleged Violation of Refuse Act and New York Harbor Act, and for Creation of Public Nuisance).
W74-02526 6E

NEW YORK CITY
Urban Storm Drainage Activities in New York,
W74-02171 4A

NEW ZEALAND
The Water Balance of New Zealand,
W74-02291 2A

NEW ZEALAND (BANKS PENINSULA)
Slope Aspect and Tunnel Erosion in the Loess of Banks Peninsula, New Zealand,
W74-02288 2J

NEW ZEALAND (NELSON)
Mapping Average Annual Surface Water Resources of the Hydrological Regions of Nelson, New Zealand,
W74-02290 2E

NEW ZEALAND (NORTH ISLAND)
The Relationships Between Land Use and Erosion in the Central North Island, New Zealand,
W74-02287 4D

NEWPORT RIVER (NC)
A Report on Bacterial Pollution Affecting Shellfish Harvesting in Newport River, North Carolina.
W74-02621 5B

NIGERIA
On the Origin of the Wet-Season Form of Zonocerus variegatus (L.) (Orth., Acrididae) In Southern Nigeria, with Some Biological Notes,
W74-02238 2I

NITRATES
Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

The Chemical Composition and Flow of the South Winterbourne in Dorset,
W74-02190 2K

Soil Pollution from Cattle Feedlots in Georgia,
W74-02210 5B

Evaluation of Nitrate Content of Ground Water in Hall County, Nebraska,
W74-02465 5B

NITRIFICATION
Influence of Soil Structure and Moisture on Nitrification,
W74-02192 2G

Nitrification of BOD-Containing Water,
W74-02485 5D

NITRILOTRIACETIC ACID
Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

NITROGEN
A Study of Factors Influencing the Nitrogen and Phosphorus Contents of Nebraska Waters,
W74-02151 5B

Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

Nitrogen, Phosphorus, and Trace Elements in Florida Surface Waters, 1970-71,
W74-02476 5A

NITROGEN COMPOUNDS
Chemistry of Marine Natural Products,
W74-02189 5B

NMR RELAXATION TITRATION
Nuclear Magnetic Resonance Relaxation Titration,
W74-02402 2K

NORTH CAROLINA
A Report on Bacterial Pollution Affecting Shellfish Harvesting in Newport River, North Carolina.
W74-02621 5B

Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

NORTH DAKOTA
Flow Analysis of Hydraulic Connectors in Artificial Recharge Systems, A Model Study,
W74-02219 4B

NUCLEAR ENERGY
Another Rio Grande for New Mexico,
W74-02461 3A

NUCLEAR MAGNETIC RESONANCE
Nuclear Magnetic Resonance Relaxation Titration,
W74-02402 2K

Analysis of Alkyl Ethoxylates by NMR,
W74-02408 5A

NUCLEAR POWER PLANTS
Studies of the Sinking Plume Phenomenon,
W74-02644 5C

Sedimentation and Scour Off Nuclear Power Plants,
W74-02645 2J

NUCLEAR POWERPLANTS
The Use of Power Plant Heat in a Physical-Chemical Domestic Wastewater Renovation System,
W74-02208 5D

NUMERICAL ANALYSIS
System 21, 'Jupiter' (A Design System for Two-Dimensional Nearly-Horizontal Flows),
W74-02159 7C

NUTRIENTS
Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 5B

Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

Effect of Irrigation, Fertilization, and Other Cultural Practices on Water Quality,
W74-02321 5C

NUTRITION
Plant Associations of the Southern Vercors Massive: Associations of Springs and Marshlands at Subalpine Elevation,
W74-02243 2I

OBSERVATION WELLS
Preliminary Analysis of ERTS-Relayed Water-Resources Data in the Delaware River Basin,
W74-02595 7B

OBSTRUCTION TO FLOW
Camden Special Road District of Ray County V. Taylor, (Action by Special Road District for Mandatory Injunction Compelling Landowners to Remove Levy and to Permanently Enjoin them from Constructing Levy).
W74-02523 6E

OCEAN DUMPING (WASTES)
Monitoring Ocean Dumping with ERTS-1 Data,
W74-02580 7B

OCEAN WAVES
Surface and Internal Waves, (Poverkhnostnyye i vnutrenniye volny),
W74-02299 2E

OHIO
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

OIL
A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

OIL CHARACTERIZATION
Analyzing Heavy Ends of Crude,
W74-02378 5A

OIL POLLUTION
Surface Quality Assessment of Natural Bodies of Water,
W74-02181 5A

Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

Apparatus for Confining Floating Pollutants,
W74-02488 5G

Oil Skimming Apparatus,
W74-02491 5G

Underwater Tanker Ballast Water/Oil Separation,
W74-02492 5G

Floating Water Jet for Oil Slick Control,
W74-02494 5G

Water Pollution Control,
W74-02495 5G

Challenges to Federalism: State Legislation Concerning Marine Oil Pollution,
W74-02502 5G

State of Maine V. M/V Tamano (Suit to Recover Damages Incurred as Result of Discharge into Waters of Bay).
W74-02525 6E

Hydrocarbon-Oxidizing Bacteria and Their Possible Use as Controlling Agents of Oil Pollution in the Ocean,
W74-02618 5G

OIL SPILLS
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

Apparatus for Confining Floating Pollutants,
W74-02488 5G

Oil Skimming Apparatus,
W74-02491 5G

OIL SPILLS

Floating Water Jet for Oil Slick Control,
W74-02494 5G

Water Pollution Control,
W74-02495 5G

State of Maine V. M/V Tamano (Suit to Recover Damages Incurred as Result of Discharge into Waters of Bay).
W74-02525 6E

Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

Investigation of Sorbents for Removing Oil Spills from Waters,
W74-02636 5G

OILY WATER

Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

Hydrocarbon-Oxidizing Bacteria and Their Possible Use as Controlling Agents of Oil Pollution in the Ocean,
W74-02618 5G

Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

OPEN CHANNEL FLOW

The Turbulent Temperature Mixing Layer,
W74-02162 8B

Flow in Open Channels With Smooth Curved Boundaries,
W74-02312 8B

OPTICAL PROPERTIES

Optical Constants of Water in the 200-nm to 200-Micrometer Wavelength Region,
W74-02167 2K

OPTIMIZATION

Optimization of Industrial Systems with the Separable Programming and the Generalized Reduced Gradient Methods,
W74-02213 5G

OPTIMUM DEVELOPMENT PLANS

Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

Cost Effectiveness of Current Environmental Engineering Practices,
W74-02225 5D

OREGON

Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

ORGANIC COMPOUNDS

Chemistry of Marine Natural Products,
W74-02189 5B

Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

Potentiality of the Coupling of Column Liquid Chromatography and Field Desorption Mass Spectrometry,
W74-02430 2K

Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

Hydrocarbon-Oxidizing Bacteria and Their Possible Use as Controlling Agents of Oil Pollution in the Ocean,
W74-02618 5G

ORGANIC HYDROXY ACIDS

Ion-Exchange Separations on Mixed Columns,
W74-02398 5A

ORGANIC MATTER

Use of Sephadex Gel for the Fractionation of Organic Matter in Lake Water, (In Russian),
W74-02343 5A

ORGANIC SOILS

The Effects of Trace Metals on Ground Water Quality as Influenced by Soils Reflecting Differences in Organic Matter Content and Genetic Conditions,
W74-02211 5B

Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

ORGANIC SOLVENTS

Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

ORGANIC WASTES

Using the Adsorption Method on Activated Charcoal with Chloroform Extraction (CCE) for Evaluating Water Pollution by Organic Substances, (In Russian),
W74-02232 5B

The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

ORGANOPHOSPHORUS PESTICIDES

Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

OSAKA BAY (JAPAN)

Polluted and Turbid Water Masses in Osaka Bay and Its Vicinity Revealed with ERTS-A Imageries,
W74-02586 7B

OSCILLATING WATER TUNNEL

A Shear Plate for Use in Oscillatory Flow,
W74-02161 2E

OSMIUM

Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

OUTFALL SEWERS

Water Quality Characteristics of Storm Sewer Discharges and Combined Sewer Overflows,
W74-02345 5B

OXIDATION

The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

OXONES

Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

OXYGENATION

In-Pipe Wastewater Cleanup.
W74-02269 5D

PANAMA CANAL

In RE Chinese Maritime Trust, Ltd., (Wreck Obstructing Navigable Waters of the Panama Canal).
W74-02513 6E

PAPERBOARD

Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

PARALLEL DITCHES

Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

PARAOXON

Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

PARATHION

Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

PARTICLE SHAPE

Investigation of Fall Velocity of Sediments in Mountain Streams, (Issledovaniye gidravlicheskoy krupnosti nanosov gornykh rek),
W74-02306 2J

PARTICLE SIZE

Investigation of Fall Velocity of Sediments in Mountain Streams, (Issledovaniye gidravlicheskoy krupnosti nanosov gornykh rek),
W74-02306 2J

PASTURES

Influence of the Soil Water Level on Microbial Processes of Pasture and Forest Communities,
W74-02194 2G

PATENTS

Method for Removing Suspended Solids from Liquids,
W74-02484 5D

Nitrification of BOD-Containing Water,
W74-02485 5D

Method and Apparatus for Electrolytic Treatment of Sewage,
W74-02486 5D

Process for Removal of Contaminants from Wastes,
W74-02487 5D

Apparatus for Confining Floating Pollutants,
W74-02488 5G

Sewage Treatment Apparatus,
W74-02489 5D

Multi-Stage Flash Evaporator,
W74-02490 3A

Oil Skimming Apparatus,
W74-02491 5G

Underwater Tanker Ballast Water/Oil Separation,
W74-02492 5G

System for Monitoring Contaminants in Liquids,
W74-02493 5A

Floating Water Jet for Oil Slick Control,
W74-02494 5G

Water Pollution Control,
W74-02495 5G

Internally Interconnected Multi-Stage Distillation System,
W74-02496 3A

'ATH OF POLLUTANTS
Agricultural Chemicals in Surface Runoff, Ground Water, and Soil: 1. Endrin,
W74-02152 5B

Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 5B

Experimental and Predicted Movement of Three Herbicides in a Water-Saturated Soil,
W74-02156 5B

Dispersion in Flow from a Continuous Source at Sea,
W74-02163 5B

The Effects of Trace Metals on Ground Water Quality as Influenced by Soils Reflecting Differences in Organic Matter Content and Genetic Conditions,
W74-02211 5B

Field Tests on Transverse Mixing in Rivers,
W74-02318 5B

Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

Monitoring Ocean Dumping with ERTS-1 Data,
W74-02580 7B

ATTERN RECOGNITION
Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

EAK DISCHARGE
California High Water, 1970-1971,
W74-02474 2E

PELOBATES-FUSCUS
The Age Group Distribution of Pelobates fuscus (Laur.) at the Kuibyshev Reservoir Shores (In Russian),
W74-02641 2H

Age Structure of Populations of Some Amphibia on Banks of Water Reservoirs (In Czech),
W74-02650 2H

PELTIER EFFECT
Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

PENALTIES (LEGAL)
State of New Jersey, Department of Environmental Protection V. Jersey Central Power and Light Company (Action to Enforce Penalty Provision for Discharge of Harmful Substance into Tidal Waters).
W74-02520 6E

PENNSYLVANIA
Hurricane Agnes Floods East Mahantango Creek,
W74-02174 2E

PENTACHLOROPHENOL
Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

PERIPHYTON
An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

PERMEABILITY
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

PERMITS
Yoffe V. Special Board, Chapter 387, (State Denial of License to Exploit Natural Resources of a Lake Bed).
W74-02514 6E

PERU
Scientific Aspects of Maritime Sovereignty Claims,
W74-02498 6E

PEST MANAGEMENT
Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

PESTICIDE FORMULATIONS
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

PESTICIDE KINETICS
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

PESTICIDE RESIDUES
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

PESTICIDE TOXICITY
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

PETROLEUM HYDROCARBONS
Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

PHENOLOGY
The Phenology of Dragonflies in the Dehra Dun Valley, India,
W74-02237 2I

PHENOLS
Study of the Intracellular Water State in Plants Under the Effect of Phenols, (In Russian),
W74-02234 2I

The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

PHOSPHATES
Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

PHOSPHORUS
A Study of Factors Influencing the Nitrogen and Phosphorus Contents of Nebraska Waters,
W74-02151 5B

Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

PHOSPHORUS

Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

Nitrogen, Phosphorus, and Trace Elements in Florida Surface Waters, 1970-71,
W74-02476 5A

PHOSPHOTHIOATE PESTICIDES
Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

PHOTODECOMPOSITION
Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

Picloram Photolytic Decomposition,
W74-02383 5B

Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

PHOTOGRAMMETRY
Floodplain Mapping and Planning for the 50 and 100 Year Interval Flood Zones of the Bitterroot Valley, Montana,
W74-02215 4A

PHOTOGRAPHY
Use of ERTS-1 in Coastal Studies,
W74-02633 2L

PHOTOLYSIS
Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

PHOTONUCLEAR ACTIVATION ANALYSIS
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

PHOTOSYNTHETIC PRODUCTIVITY
Comparative Productivity Studies of Three Mecklenburg Lakes (Lake Kummerow, Lake Teterow and Lake Malchin), (In German),
W74-02558 2H

PHREATOPHYTES
Evapotranspiration and Watershed Research as Related to Riparian and Phreatophyte Management--An Abstract Bibliography.
W74-02630 2D

PHYTOINDICATORS
Phytoindication of Saline Ground in Drying Up Shallow Lakes, (In Russian),
W74-02559 2H

PHYTOPLANKTON
Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

PHYTOSOCIOLOGICAL STUDIES
Ecological and Phytosociological Study of a Sector in the Lybian Desert,
W74-02507 2I

PHYTOTOXICITY
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

PICLORAM
Picloram Photolytic Decomposition,
W74-02383 5B

PIERS
Hydrologic Evaluations in Bridge Pier Scour Design,
W74-02309 8B

PIKE
Some Characteristics of Cesium-137 Accumulation in Populations of Freshwater Fish, (In Russian),
W74-02196 5C

PIMIENTO CANNERY
Characterization of Waste Effluents from a Commercial Pimento Canning Operation,
W74-02379 5A

PLANKTON
Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

Description, Distribution, and Ecology of the Rotifer and Crustacean Plankton Communities, Flathead Lake, Montana,
W74-02448 2H

PLANNING
Water and Sewerage Improvements Needed in 1975 in Chatham County, Georgia.
W74-02186 5D

Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

Metropolitan Water and Sewer Plan, Lubbock Metropolitan Council of Governments.
W74-02331 3D

Tombigbee River Valley Water Management District, Tenth Annual Report.
W74-02332 6B

Regional Wastewater Facilities Study.
W74-02338 5D

The Balance of Surface Water Resources in the Lower Mesopotamian Valley,
W74-02350 6B

The Importance of Sediment Transport in Water Resources Planning,
W74-02351 4D

Evolving Water Policy and Management in the United States,
W74-02358 6B

State Water Plan, Proceedings of 18th Annual New Mexico Water Conference.
W74-02456 6B

PLANT COMMUNITIES
Plant Associations of the Southern Vercors Massive: Associations of Springs and Marshlands at Subalpine Elevation,
W74-02243 2I

PLANT COMMUNITY MAPPING
Use of the Sri Electronic Satellite Image Analysis Console for Mapping Southern Arizona Plant Communities from ERTS-1 Imagery,
W74-02593 7B

PLANT TISSUES
Study of the Intracellular Water State in Plants Under the Effect of Phenols, (In Russian),
W74-02234 2I

PLASMOLYSIS TIME
Study on the Plasmolysis Time in Epidermal Cells from Leaves of Saxifraga stolonifera Meerb (In Japanese),
W74-02542 2I

PLASTICS
Adsorption Characteristics of Silber, Lead, Cadmium, Zinc, and Nickel on Borosilicate Glass, Polyethylene, and Polypropylene Container Surfaces,
W74-02412 5A

PLAYAS
Dynamics of Playa Lakes in the Texas High Plains,
W74-02598 7B

PLUM ISLAND (MASS)
Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

POLAND
The Effect of Organic Substrates on the Abundance of Bacteria in the Water of 5 Masurian Lakes,
W74-02556 5C

POLAND (RABA RIVER VALLEY)
Cleanliness of Wells, Chemical Substances in Drinking Water and Their Relation to Caries (In Polish),
W74-02544 5C

POLE MOUNTAIN (WYO)
Evaporation from Snowdrifts Under Oasis Conditions,
W74-02183 2D

POLITICAL ASPECTS
New Concepts in the Law of the Sea,
W74-02497 6E

Ocean Science and Mutual Assistance: An Uneasy Alliance,
W74-02500 6E

Development of the Freedom of Scientific Research Issue of the Third Law of the Sea Conference,
W74-02501 6E

POLLUTANT IDENTIFICATION
Detection of Pollutants in Water by Raman Spectroscopy,
W74-02164 5A

Surface Quality Assessment of Natural Bodies of Water,
W74-02181 5A

Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

Picloram Photolytic Decomposition,
W74-02383 5B

Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

The Determination of Methyl Mercury in Urine,
W74-02387 5A

Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

The Use and Effect of Mixed Standards on the Quantitation of Polychlorinated Biphenyls,
W74-02393 5A

Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

Selection of Experimental Conditions for the Photometric Complex Formation Titrations of Metals in the PPM-Range,
W74-02404 5A

Analysis of Alkyl Ethoxylates by NMR,
W74-02408 5A

Hanging Mercury Drop Electrodeposition Technique for Carbon Filament Flameless Atomic Absorption Analysis. Application to the Determination of Copper in Sea Water,
W74-02411 2K

The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

An Automated Analysis for Urea in Seawater,
W74-02421 5A

Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

Potentiality of the Coupling of Column Liquid Chromatography and Field Desorption Mass Spectrometry,
W74-02430 2K

Determination of Small Amounts of Uranium After Concentrating Through Extraction and Anionic Exchange in a Solvent Agent System Containing Tri-N-Octylphosphine Oxide. (Bestimmung geringer Uranmengen nach Konzentrierun g durch Extraktion und Anionenaustausch in einem tri-n-octylphoshinoxidhaltigen Losungsmittelsystem),
W74-02434 5A

A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

POLLUTANTS

System for Monitoring Contaminants in Liquids,
W74-02493 5A

POLLUTION ABATEMENT

Characterization and Treatment of Fish Processing Plant Effluents in Canada,
W74-02262 5D

Effluent Treatment at Man-Made Fibre Production Units,
W74-02263 5D

(TAPPI) Environmental Conference, May 14-16, 1973.
W74-02273 5D

The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

Apparatus for Confining Floating Pollutants,
W74-02488 5G

Oil Skimming Apparatus,
W74-02491 5G

Underwater Tanker Ballast Water/Oil Separation,
W74-02492 5G

Floating Water Jet for Oil Slick Control,
W74-02494 5G

Water Pollution Control,
W74-02495 5G

Public Water Supplies.
W74-02539 5G

Hydrocarbon-Oxidizing Bacteria and Their Possible Use as Controlling Agents of Oil Pollution in the Ocean,
W74-02618 5G

Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

Investigation of Sorbents for Removing Oil Spills from Waters,
W74-02636 5G

Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

POLLUTION-COSTS (PUBLIC)

Economic Aspects of Environmental Protection (In German),
W74-02227 5G

POLLUTION SOURCES

Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

Investigation of Sorbents for Removing Oil Spills from Waters,
W74-02636 5G

POLYCHLORINATED BENZENES

Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

POLYCHLORINATED BIPHENYLS

Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

The Use and Effect of Mixed Standards on the Quantitation of Polychlorinated Biphenyls,
W74-02393 5A

POLYCHLORINATED NAPHTHALENES

Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls,

POLYCHLORINATED NAPHTHALENES

Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

POLYCHLORINATED TERPHENYLS
Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

PONDS
Preliminary Evaluation of ERTS-1 for Determining Numbers and Distribution of Prairie Ponds and Lakes,
W74-02597 7B

POROSITY
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

POROUS MEDIA
Damping of Water Waves Over Porous Bed,
W74-02315 2E

POTABLE WATER
Some Regularities of Sr90 Accumulation in the Body of a Rat with a High Fluorine Content in Its Drinking Water, (In Russian),
W74-02195 5C

Effect of A Cement Anticorrosion Coating on the Quality of Drinking Water, (In Russian),
W74-02233 5B

Relation of Mineral and Hormone Metabolism to Intake of Water with a High Natural Content of Fluoride,
W74-02235 5C

The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

Hygienic Conditions in the Procurement of Drinking Water from Individual Sources (In German),
W74-02547 5B

POTENTIOMETERS
Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

POTENTIOMETRIC TITRATION
Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

POTOMAC RIVER
Digital Analysis of Potomac River Basin ERTS Imagery: Sedimentation Levels at the Potomac-Anacostia Confluence and Strip Mining in Allegheny County, Maryland,
W74-02583 7B

POTTASSIUM
The Effect of Soil Moisture Upon the Availability of Potassium and its Influence on the Growth of Young Maize Plants (Zea mays L.),
W74-02554 3F

POULTRY
Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

POWER MARKETING
Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

PRECIPITATION (ATMOSPHERIC)
The Water Balance of New Zealand,
W74-02291 2A

Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

PREDICTION MODELS
Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

PRESCRIPTIVE RIGHTS
Kelly V. Alpstetten Association, Inc. (Action to Enjoin Termination of Water Service, Wherein Defendant Counterclaimed for Back Charges).
W74-02532 6E

PRESSURE CONDUITS
In-Pipe Wastewater Cleanup.
W74-02269 5D

PRESSURE PIPE TREATMENT
In-Pipe Wastewater Cleanup.
W74-02269 5D

PROBABILITY
Probability Analysis in an Approximate Theory of Movement of Water Masses, (Veroyatnostnyy analiz v priblizhennoy teorii peremeshcheniya vodnykh mass),
W74-02305 2E

Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

PROCLADIUS
Contribution to the Study of Zooplankton and Zoobenthos in the Mingechaur Reservoir, (In Russian),
W74-02341 2H

PROGRAMMING LANGUAGES
Hymo: Problem-Oriented Computer Language for Hydrologic Modeling--Users Manual,
W74-02469 2A

PROJECT FEASIBILITY
The Ex Post Measurement of Benefits and Costs in Small Watershed Projects,
W74-02212 6B

PROJECTIONS
Population Projectsions for the New Mexico State Water Plan,
W74-02458 6B

PROJECTS
Approaches to State Coastal Management,
W74-02185 2L

Flood Control Funds -- 1970 Report to the Legislature.
W74-02292 6C

Tombigbee River Valley Water Management District, Tenth Annual Report.
W74-02332 6B

PROTECTION
Public Water Supplies.
W74-02539 5G

PROTEINS
Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

PSYCHROMETIC DATA
Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

PUBLIC ACCESS
Public Access to Beaches: Common Law Doctrines and Constitutional Challenges.
W74-02512 6E

Coleman V. Forister (Suit to Establish Right of Use of Land for Ingress and Egress to Creek Waterfront).
W74-02517 6E

PUBLIC HEALTH
Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

Public Water Supplies--Chlorination.
W74-02538 5G

PUBLIC RIGHTS
Wetland Fill-Restrictions Do Not Constitute a Compensable 'Taking' Within the Meaning of the Fifth Amendment,
W74-02503 4A

PUBLIC UTILITIES
City of Hollywood V. Yarborough (Review of Public Service Commission Order Authorizing Utility to Provide Water Service in Unincorporated Area which Petitioner Claimed to have Exclusive Control Over).
W74-02530 6E

PUBLIC UTILITY DISTRICT
Canyon Public Service District V. Tasa Coal Company (Eminent Domain Proceeding Held Public Service District had Right to Condemn Defendant's Lands for Use in Connection with Sewer Facilities, Defendant Appeals) .
W74-02531 6E

PUERTO RICO
Selected References, Ground-Water Contamination, The United States of America and Puerto Rico.
W74-02482 5B

PUGET SOUND (WASH)
Puget Sound Resident Coho Salmon Study,
W74-02639 2L

PULP AND PAPER INDUSTRY
Manufacture of Capacitor Paper -- Some Problems with Fresh Water Preparation, (Erzeugung von Kondensatorpapier -- einige Probleme bei der Frischwasserherstellung),
W74-02247 5D

Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological Institute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

(TAPPI) Environmental Conference, May 14-16, 1973.
W74-02273 5D

The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

PULP WASTES

Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

Problems with Colored Papers: Are They a Cause of Pollution, (Probleme mit farbigen Papieren: Sind sie eine Ursache von Verschmutzung),
W74-02255 5B

Hylte Bruk: Newsprint and Environmental Protection, (Hylte Bruk: Zeitungsdruckpapier and Umweltschultz).
W74-02256 5D

Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological Institute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

Sodium Recovery from a Pulp Mill Waste Effluent by Ion Exchange,
W74-02259 5D

Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

Advanced Practical Water Recycle in Tissue Manufacture,
W74-02279 5D

Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

Color Removal from Kraft Pulp Mill Effluents by Massive Lime Treatment,
W74-02284 5D

Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

QUANTITATIVE ANALYSIS

The Use and Effect of Mixed Standards on the Quantitation of Polychlorinated Biphenyls,
W74-02393 5A

RADIOACTIVE DATING

Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

RADIOACTIVE WASTES

Distribution of Caesium-137 in British Coastal Waters,
W74-02365 5B

RADIOACTIVITY TECHNIQUES

Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

Picloram Photolytic Decomposition,
W74-02383 5B

Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

RADIOCHEMICAL ANALYSIS

Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

RAIN GAGES

Comparison of Raingauge Evaporation Suppressants,
W74-02289 2D

RAINFALL

Application and Consequences of Precipitation Observations in the Republic of Sudan in View of the Nomadic Life and Economy,
W74-02348 2B

A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

Storm Rainfall in the Carpathians in June 1969,
W74-02606 2B

Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

RAINFALL INTENSITY

Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

Hurricane Agnes Floods East Mahantango Creek,
W74-02174 2E

Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

RAINFALL-RUNOFF RELATIONSHIPS

Hurricane Agnes Floods East Mahantango Creek,
W74-02174 2E

Computer Simulation of Storm Water Runoff,
W74-02310 2E

Elevation Dependent Model for Estimating Annual Runoff,
W74-02317 2A

Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Houston, Texas Metropolitan Area, 1971,
W74-02471 2E

Annual Compilation and Analysis of Hydrologic Data for Calaveras and Escondido Creeks, San Antonio River Basin, Texas, 1971,
W74-02478 2E

RAMAN SPECTROSCOPY

Detection of Pollutants in Water by Raman Spectroscopy,
W74-02164 5A

RANGE MANAGEMENT

Guide to Improvement of Arizona Rangeland.
W74-02349 4A

RECHARGE PONDS

Ground-Water Recharge for Urban Use: Leaky Acres Project,
W74-02468 4B

RECHARGE WELLS

Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

RECLAIMED LAND

On the Variation of Salinity Distribution in a Reservoir, Situated in Reclaimed Land, (Japanese),
W74-02246 2H

RECOVERY

A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

RECREATION

User Related Study of Three Michigan Rivers,
W74-02202 6B

The Problems and Issues of Implementing the Federal Water Project Recreation Act in the Pacific Northwest,
W74-02453 6C

RECREATION DEMAND

The Demand for and Value of the Sport Fishery on the Au Sable, Jordan, and Red Cedar Rivers,
W74-02204 6B

RECYCLING

Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological Institute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

Advanced Practical Water Recycle in Tissue Manufacture,
W74-02279 5D

RECYCLING

Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

RED TIDE

Red Tide in Ise Bay,
W74-02587 7B

REFRACTIVITY

Optical Constants of Water in the 200-nm to 200-Micrometer Wavelength Region,
W74-02167 2K

REFUSE ACT

United States V. Lindsay (Government's Action Against City for Alleged Violation of Refuse Act and New York Harbor Act, and for Creation of Public Nuisance).
W74-02526 6E

REGIONAL ANALYSIS

Regional Wastewater Facilities Study.
W74-02338 5D

Use of Systems Approaches in Planning Israel's Water Resources Management,
W74-02352 6A

Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

REGIONAL DEVELOPMENT

A Water and Sewer Plan: Greene County, Georgia.
W74-02334 5D

A Water and Sewer Plan: Morgan County, Georgia.
W74-02335 5D

A Water and Sewer Plan: Madison County, Georgia.
W74-02336 5D

A Water and Sewer Plan: Walton County, Georgia.
W74-02337 5D

Northeast Georgia Area Water and Sewer Systems Plan and Capital Improvement Program.
W74-02339 3D

Evolving Water Policy and Management in the United States,
W74-02358 6B

REGRESSION ANALYSIS

Predicting Avalanche Intensity from Weather Data: A Statistical Analysis,
W74-02294 2C

REMEDIES

Groundwater Pollution in the Western States--Private Remedies and Federal and State Legislation,
W74-02506 5G

REMOTE SENSING

An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

Aerial Remote Sensing of Carbonate Terranes in Shelby County, Alabama,
W74-02467 7B

ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

Recognition of Surface Lithologic and Topographic Patterns in Southwest Colorado with ADP Techniques,
W74-02562 7B

ERTS-1 Imagery as an Aid to the Definition of the Geotectonic Domains of the Southern African Crystalline Shield,
W74-02563 7B

New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

Structural Lineaments of Gaspe from ERTS Imagery,
W74-02565 7B

Lineaments in Coastal Plain Sediments as Seen in ERTS Imagery,
W74-02566 7B

Evaluation of Commercial Utility of ERTS-A Imagery in Structural Reconnaissance for Minerals and Petroleum,
W74-02567 7B

Structural Interpretations Based on ERTS-1 Imagery, Bighorn Region, Wyoming-Montana,
W74-02568 7B

Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

A New Fault Lineament in Southern California,
W74-02570 7B

Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

ERTS-1 Investigation of Ecological Effects of Strip Mining in Eastern Ohio,
W74-02572 7B

The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

Monitoring Vegetation Cover on Mine Dumps with ERTS-1 Imagery: Some Initial Results,
W74-02574 7B

Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

Detection, Mapping and Estimation of Rate Spread of Grass Fires from Southern African ERTS-1 Imagery,
W74-02576 7B

Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

Monitoring Ocean Dumping with ERTS-1 Data,
W74-02580 7B

Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

Digital Analysis of Potomac River Basin ERTS Imagery: Sedimentation Levels at the Potomac-Anacostia Confluence and Strip Mining in Allegheny County, Maryland,
W74-02583 7B

A Study on the Erosion of Niigata Beach from ERTS-A Imagery,
W74-02584 7B

Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

Polluted and Turbid Water Masses in Osaka Bay and Its Vicinity Revealed with ERTS-A Imageries,
W74-02586 7B

Red Tide in Ise Bay,
W74-02587 7B

Hydrogeology of Closed Basins and Deserts of South America, ERTS-1 Interpretations,
W74-02588 7B

Detection of Major River Bed Changes in the River Ebro (North-Eastern Spain),
W74-02589 7B

Applications of Multispectral Imagery to Water Resources Development Planning in the Lower Mekong Basin (Khemer Republic, Laos, Thailand and Viet-Nam),
W74-02590 7B

Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

Assessment of Flood Damage in Arizona by Means of ERTS-1 Imagery,
W74-02592 7B

Use of the Sri Electronic Satellite Image Analysis Console for Mapping Southern Arizona Plant Communities from ERTS-1 Imagery,
W74-02593 7B

Monitoring of Streamflow in the Verde River by ERTS-1 Data Collection System (DCS),
W74-02594 7B

Preliminary Analysis of ERTS-Relayed Water-Resources Data in the Delaware River Basin,
W74-02595 7B

An Evaluation of Space Acquired Data as a Tool for Management of Wildlife Habitat in Alaska,
W74-02596 7B

Preliminary Evaluation of ERTS-1 for Determining Numbers and Distribution of Prairie Ponds and Lakes,
W74-02597 7B

Dynamics of Playa Lakes in the Texas High Plains,
W74-02598 7B

Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

Progress of an ERTS-1 Program for Lake Ontario and its Basin,
W74-02600 7B

Remote Sensing of Turbidity Plumes in Lake Ontario,
W74-02601 7B

ERTS-1 Views the Great Lakes,
W74-02602 7B

Use of ERTS Data for Mapping Snow Cover in the Western United States,
W74-02603 7B

Evaluation of ERTS Imagery for Mapping and Detection of Changes of Snowcover on Land and on Glaciers,
W74-02604 7B

Use of ERTS-1 in Coastal Studies,
W74-02633 2L

An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

REMOTE SENSORS
An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

RESEARCH AND DEVELOPMENT
The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

Development of the Freedom of Scientific Research Issue of the Third Law of the Sea Conference,
W74-02501 6E

RESERVOIR OPERATION
Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

RESERVOIR RELEASES
Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

RESERVOIRS
Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

RESINS
Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

RETAINING WALLS
Annual Compilation and Analysis of Hydrologic Data for Green Creek, Brazos River Basin, Texas, 1971,
W74-02626 4D

REVERSE OSMOSIS
Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

REVIEWS
Survey of Methods of Treating Wine and Grape Waste Water,
W74-02329 5D

Water Quality Characteristics of Storm Sewer Discharges and Combined Sewer Overflows,
W74-02345 5B

Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

Report by the National Water Commission--A Review,
W74-02463 6B

On the Concept and Determination of Critical Soil Moisture,
W74-02546 2G

Antarctic Limnology: A Review,
W74-02552 2C

RICE
Factors Affecting the Manganese Status in Soils of the U.A.R.,
W74-02200 2G

Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

RIO GRANDE REGION
A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

RIPARIAN WATER LOSS
Evapotranspiration and Watershed Research as Related to Riparian and Phreatophyte Management--An Abstract Bibliography.
W74-02630 2D

RISKS
A Bayesian Decision Framework for Synthetic Hydrology,
W74-02438 6A

RIVER BASIN DEVELOPMENT
River Basin Monetary Authorizations--Disaster Relief Act Amendments.
W74-02516 6E

A Bill to Authorize the Secretary of the Interior to Construct, Operate, and Maintain the Pollock-Herreid Unit, South Dakota Pumping Division, Missouri River Basin Project, South Dakota.
W74-02529 6E

RIVER BASINS
Water-Balance Method and Its Practical Importance, (Metod vodnogo balansa i yego prakticheskoye znacheniye),
W74-02308 2A

A Bill to Authorize the Secretary of the Interior to Construct, Operate, and Maintain the Pollock-Herreid Unit, South Dakota Pumping Division, Missouri River Basin Project, South Dakota.
W74-02529 6E

Flood Control Project Maintenance and Repair--1970 Inspection Report,
W74-02617 2E

RIVER FLOW
Ultrasonic River Flow Measurement,
W74-02250 2E

RIVERS AND HARBORS ACT
In RE Chinese Maritime Trust, Ltd., (Wreck Obstructing Navigable Waters of the Panama Canal).
W74-02513 6E

ROACH
Some Characteristics of Cesium-137 Accumulation in Populations of Freshwater Fish, (In Russian),
W74-02196 5C

ROMANIA
Considerations Concerning the Biology and Distribution Area of the Cyprinid Fish Pseudorasbora parva (Schlegel) in the Romanian Waters,
W74-02553 2I

ROOKERY BAY SANCTUARY (FLA)
Applicability of the Interceptor Waterway Concept to the Rookery Bay Sanctuary,
W74-02205 4A

ROOTS
The Action of Abscisic Acid on Ion Uptake and Water Flow in Plant Roots,
W74-02260 3F

ROTATIONAL FLOW
Analysis of Internal Flow Characteristics of a Smooth-Disk Water-Brake Dynamometer,
W74-02475 8C

ROTIFERA
Some Further Results of the Zooplankton Studies in the Czechslovak-Hungarian Stretch of the Danube,
W74-02545 2I

ROTIFERS
Description, Distribution, and Ecology of the Rotifer and Crustacean Plankton Communities, Flathead Lake, Montana,
W74-02448 2H

RUNOFF
The Water Balance of New Zealand,
W74-02291 2A

RURAL AREA
A Water and Sewer Plan: Greene County, Georgia.
W74-02334 5D

RURAL AREAS
A Water and Sewer Plan: Morgan County, Georgia.
W74-02335 5D

A Water and Sewer Plan: Madison County, Georgia.
W74-02336 5D

A Water and Sewer Plan: Walton County, Georgia.
W74-02337 5D

SACRAMENTO AND SAN JOAQUIN VALLEYS (CALIF.)
Flood Control Project Maintenance and Repair--1970 Inspection Report,
W74-02617 2E

SALINE SOILS
Migration of Substances with Surface and Gravitational Waters in Soils of Geochemically Related Landscapes of Baraba, (Migratsiya veshchestv s pverkhnostnymi i gravitatsionnymi vodami v pochvakh geokhimicheski sopryazhennykh landshaftov Baraby),
W74-02300 2G

SALINE WATER
The Use of Desalted Seawater for Intensive Agricultural Applications, (El Uso de Agua de Mar Desalada Para Intensivas Aplicaciones Agricolas),
W74-02359 3A

SALINE WATER INTRUSION
Water Quality Management in Groundwater Basins,
W74-02356 5B

SALINITY
On the Relation Between the Occurrence of Desmids and the Salinity in the Hokuriku District of Japan, (In Japanese).
W74-02191 5B

Salinity Corrections for Dissolved Oxygen Measurements,
W74-02424 5A

Water Resources Development in the Mullica River Basin,
W74-02450 5C

On the Characteristics of Salt Intrusion in the Kitakami River, Miyagi Prefecture (In Japanese),
W74-02541 5B

Phytoindication of Saline Ground in Drying Up Shallow Lakes, (In Russian),
W74-02559 2H

SALINITY DISTRIBUTION
On the Variation of Salinity Distribution in a Reservoir, Situated in Reclaimed Land, (Japanese),
W74-02246 2H

SALMON
The Hydrology of Ten Streams in Western Washington as Related to the Propagation of Several Pacific Salmon Species,
W74-02297 8I

SALMON SPAWNING
The Hydrology of Ten Streams in Western Washington as Related to the Propagation of Several Pacific Salmon Species,
W74-02297 8I

SALT WATER INTRUSION
On the Characteristics of Salt Intrusion in the Kitakami River, Miyagi Prefecture (In Japanese),
W74-02541 5B

SALTS
Salt, a Little-Known Aggressor in Our Environment, (In French),
W74-02199 5B

Migration of Substances with Surface and Gravitational Waters in Soils of Geochemically Related Landscapes of Baraba, (Migratsiya veshchestv s pverkhnostnymi i gravitatsionnymi vodami v pochvakh geokhimicheski sopryazhennykh landshaftov Baraby),
W74-02300 2G

SAMPLE INJECTION
Sampling Techniques in Chromatography,
W74-02372 7B

SAMPLE PREPARATION
Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

SAMPLING
Sampling Techniques in Chromatography,
W74-02372 7B

An Improved Bottom-Water Sampler,
W74-02410 7B

Comparative Productivity Studies of Three Mecklenburg Lakes (Lake Kummerow, Lake Teterow and Lake Malchin), (In German),
W74-02558 2H

SAN ANTONIO RIVER BASIN (TEX)
Annual Compilation and Analysis of Hydrologic Data for Calaveras and Escondido Creeks, San Antonio River Basin, Texas, 1971,
W74-02478 2E

SAN FRANCISCO AREA (CALIF)
Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

SAND SINK METHOD
Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

SANDS
A Self-Draining Subsurface Rainfall Conservation System: Its Effect on the Soil Water Status and Productivity of Coastal Plains Sands,
W74-02193 2G

Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

SAPROCHAETE-SACCHAROPHYLA
Occurrence of Saprochaete saccharophyla Coker Et Shanor in Fungoid Growth below the Discharge of Breweries, (In Czech),
W74-02242 5B

SATELLITE (ARTIFICIAL)
New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

SATELLITES (ARTIFICAL)
Application and Consequences of Precipitation Observations in the Republic of Sudan in View of the Nomadic Life and Economy,
W74-02348 2B

SATELLITES (ARTIFICIAL)
ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

Recognition of Surface Lithologic and Topographic Patterns in Southwest Colorado with ADP Techniques,
W74-02562 7B

ERTS-1 Imagery as an Aid to the Definition of the Geotectonic Domains of the Southern African Crystalline Shield,
W74-02563 7B

Structural Lineaments of Gaspe from ERTS Imagery,
W74-02565 7B

Lineaments in Coastal Plain Sediments as Seen in ERTS Imagery,
W74-02566 7B

Evaluation of Commercial Utility of ERTS-A Imagery in Structural Reconnaissance for Minerals and Petroleum,
W74-02567 7B

Structural Interpretations Based on ERTS-1 Imagery, Bighorn Region, Wyoming-Montana,
W74-02568 7B

Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

A New Fault Lineament in Southern California,
W74-02570 7B

Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

ERTS-1 Investigation of Ecological Effects of Strip Mining in Eastern Ohio,
W74-02572 7B

The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

Monitoring Vegetation Cover on Mine Dumps with ERTS-1 Imagery: Some Initial Results,
W74-02574 7B

Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

Detection, Mapping and Estimation of Rate Spread of Grass Fires from Southern African ERTS-1 Imagery,
W74-02576 7B

Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

Monitoring Ocean Dumping with ERTS-1 Data,
W74-02580 7B

Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

Digital Analysis of Potomac River Basin ERTS Imagery: Sedimentation Levels at the Potomac-Anacostia Confluence and Strip Mining in Allegheny County, Maryland,
W74-02583 7B

A Study on the Erosion of Niigata Beach from ERTS-A Imagery,
W74-02584 7B

Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

Polluted and Turbid Water Masses in Osaka Bay and Its Vicinity Revealed with ERTS-A Imageries,
W74-02586 7B

Red Tide in Ise Bay,
W74-02587 7B

Hydrogeology of Closed Basins and Deserts of South America, ERTS-1 Interpretations,
W74-02588 7B

Detection of Major River Bed Changes in the River Ebro (North-Eastern Spain),
W74-02589 7B

Applications of Multispectral Imagery to Water Resources Development Planning in the Lower Mekong Basin (Khemer Republic, Laos, Thailand and Viet-Nam),
W74-02590 7B

Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

Assessment of Flood Damage in Arizona by Means of ERTS-1 Imagery,
W74-02592 7B

Use of the Sri Electronic Satellite Image Analysis Console for Mapping Southern Arizona Plant Communities from ERTS-1 Imagery,
W74-02593 7B

Monitoring of Streamflow in the Verde River by ERTS-1 Data Collection System (DCS),
W74-02594 7B

Preliminary Analysis of ERTS-Relayed Water-Resources Data in the Delaware River Basin,
W74-02595 7B

An Evaluation of Space Acquired Data as a Tool for Management of Wildlife Habitat in Alaska,
W74-02596 7B

Preliminary Evaluation of ERTS-1 for Determining Numbers and Distribution of Prairie Ponds and Lakes,
W74-02597 7B

Dynamics of Playa Lakes in the Texas High Plains,
W74-02598 7B

Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

Progress of an ERTS-1 Program for Lake Ontario and its Basin,
W74-02600 7B

Remote Sensing of Turbidity Plumes in Lake Ontario,
W74-02601 7B

ERTS-1 Views the Great Lakes,
W74-02602 7B

Use of ERTS Data for Mapping Snow Cover in the Western United States,
W74-02603 7B

Evaluation of ERTS Imagery for Mapping and Detection of Changes of Snowcover on Land and on Glaciers,
W74-02604 7B

Use of ERTS-1 in Coastal Studies,
W74-02633 2L

SATURATED FLOW

Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

Saturated-Unsaturated Seepage by Finite Elements,
W74-02313 2G

SATURATED SOILS

Experimental and Predicted Movement of Three Herbicides in a Water-Saturated Soil,
W74-02156 5B

A Study of Items in the Groundwater Balance of Waterlogged Areas (Ob uzuchenii elementov balansa gruntovykh vod no zabolochennykh uchastkakh),
W74-02610 2D

SAVANNAH (GEO)

Water and Sewerage Improvements Needed in 1975 in Chatham County, Georgia.
W74-02186 5D

SAWTOOTH RANGE (MONT)

The Role of Deformation in Changing the Reservoir Properties of Aquifers,
W74-02446 2F

SAXIFRAGA-STOLONIFERA

Study on the Plasmolysis Time in Epidermal Cells from Leaves of Saxifraga stolonifera Meerb (In Japanese),
W74-02542 2I

SCIOTO RIVER BASIN (OHIO)

Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

SCOTLAND (HOLY LOCH)

Dispersion in Flow from a Continuous Source at Sea,
W74-02163 5B

SCOUR

Hydrologic Evaluations in Bridge Pier Scour Design,
W74-02309 8B

Bed Scour at End-Dump Channel Constrictions,
W74-02316 8B

Sedimentation and Scour Off Nuclear Power Plants,
W74-02645 2J

SEA-FOAM MASSES

Persistent Sea-Foam Masses -- A Problem Solved,
W74-02180 5B

SEA WATER

Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

SEASONAL

Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

SEAWATER

Hanging Mercury Drop Electrodeposition Technique for Carbon Filament Flameless Atomic Absorption Analysis. Application to the Determination of Copper in Sea Water,
W74-02411 2K

An Automated Analysis for Urea in Seawater,
W74-02421 5A

Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

SEDIMENT CONTROL

Prescribed Fire Effects on Water Repellency, Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4C

SEDIMENT TRANSPORT

A New Oscillating Water Tunnel,
W74-02160 2J

The Importance of Sediment Transport in Water Resources Planning,
W74-02351 4D

Research in the Coastal and Oceanic Environment,
W74-02481 2L

Bulletin and Summary of Research Progress Fiscal Years 1970-71.
W74-02647 2L

Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

SEDIMENTATION

The Importance of Sediment Transport in Water Resources Planning,
W74-02351 4D

SEDIMENTATION RATES

Bolinas Lagoon, Marin County, California, Summary of Sedimentation and Hydrology, 1967-69,
W74-02296 2L

SEDIMENTOLOGY

Investigation of Fall Velocity of Sediments in Mountain Streams, (Issledovaniye

gidravlicheskoy krupnosti nanosov gornykh rek),
W74-02306 2J

SEDIMENTS
The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

SEEDLING CROPS
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

SEEPAGE
Saturated-Unsaturated Seepage by Finite Elements,
W74-02313 2G

Studies on Seepage from Canals with Partial Lining,
W74-02319 4A

SEICHES
Long Waves in Shallow Triangular Channels,
W74-02158 2E

Adjustment of Friction in Hydraulic Models of Lakes,
W74-02314 2H

SELECTIVITY
Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

SENSITIVITY
Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

SENSORS
System for Monitoring Contaminants in Liquids,
W74-02493 5A

SEPARATION TECHNIQUES
Use of Sephadex Gel for the Fractionation of Organic Matter in Lake Water, (In Russian),
W74-02343 5A

Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

Extraction and Spectrophotometric Determination of Vanadium as a Mixed Ligand Complex of Oxine and Azide,
W74-02362 5A

Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

Analyzing Heavy Ends of Crude,
W74-02378 5A

A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

The Use and Effect of Mixed Standards on the Quantitation of Polychlorinated Biphenyls,
W74-02393 5A

Ion-Exchange Separations on Mixed Columns,
W74-02398 5A

Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

High Precision Sampling for Chromatographic Separations,
W74-02414 2K

The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

Potentiality of the Coupling of Column Liquid Chromatography and Field Desorption Mass Spectrometry,
W74-02430 2K

Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

Anionic Exchange Separations of the Elements that can be Extracted with Tributyl Phosphate. II, (Anionenaustauschtrennungen der mit Tributylphosphat extrahierbaren Elemente. II),
W74-02432 2K

Determination of Small Amounts of Uranium After Concentrating Through Extraction and Anionic Exchange in a Solvent Agent System Containing Tri-N-Octylphosphine Oxide. (Bestimmung geringer Uranmengen nach Konzentrierun g durch Extraktion und Anionenaustausch in einem tri-n-octylphoshinoxidhaltigen Losungsmittelsystem),
W74-02434 5A

Apparatus for Confining Floating Pollutants,
W74-02488 5G

Underwater Tanker Ballast Water/Oil Separation,
W74-02492 5G

Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

SEPHADEX GEL FILTRATION
Use of Sephadex Gel for the Fractionation of Organic Matter in Lake Water, (In Russian),
W74-02343 5A

SETTLING VELOCITY
Investigation of Fall Velocity of Sediments in Mountain Streams, (Issledovaniye gidravlicheskoy krupnosti nanosov gornykh rek),
W74-02306 2J

SEWAGE
The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

United States V. Lindsay (Government's Action Against City for Alleged Violation of Refuse Act and New York Harbor Act, and for Creation of Public Nuisance).
W74-02526 6E

SEWAGE DISPOSAL
Fourth Annual Report, City of Carbondale, Illinois, Water and Wastewater Treatment.
W74-02328 5D

United States V. Lindsay (Government's Action Against City for Alleged Violation of Refuse Act and New York Harbor Act, and for Creation of Public Nuisance).
W74-02526 6E

SEWAGE EFFLUENTS
Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

SEWAGE SYSTEMS
Regional Water, Sewage, and Solid Waste Districts.
W74-02535 5D

SEWAGE TREATMENT
The Use of Power Plant Heat in a Physical-Chemical Domestic Wastewater Renovation System,
W74-02208 5D

Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

In-Pipe Wastewater Cleanup.
W74-02269 5D

Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

Fourth Annual Report, City of Carbondale, Illinois, Water and Wastewater Treatment.
W74-02328 5D

Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

Method and Apparatus for Electrolytic Treatment of Sewage,
W74-02486 5D

Sewage Treatment Apparatus,
W74-02489 5D

SEWERAGE
Water and Sewerage Improvements Needed in 1975 in Chatham County, Georgia.
W74-02186 5D

City of Austin, Texas, Study of Wastewater Collection System: Phase I.
W74-02330 5D

Metropolitan Water and Sewer Plan, Lubbock Metropolitan Council of Governments.
W74-02331 3D

A Water and Sewer Plan: Greene County, Georgia.
W74-02334 5D

A Water and Sewer Plan: Morgan County, Georgia.
W74-02335 5D

A Water and Sewer Plan: Madison County, Georgia.
W74-02336 5D

A Water and Sewer Plan: Walton County, Georgia.
W74-02337 5D

Northeast Georgia Area Water and Sewer Systems Plan and Capital Improvement Program.
W74-02339 3D

SEWERS
City of Austin, Texas, Study of Wastewater Collection System: Phase I.
W74-02330 5D

SHALLOW WATER
Two-Dimensional Waves Generated by a Surface Pressure Disturbance Over a Sloping Beach,
W74-02187 2E

Use of ERTS-1 in Coastal Studies,
W74-02633 2L

Wave Breaking in Shallow Water,
W74-02638 2L

Design Considerations for a 3-D Laser Doppler Velocimeter for Studying Gravity Waves in Shallow Water,
W74-02642 2L

Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

SHEAR STRESS
A Shear Plate for Use in Oscillatory Flow,
W74-02161 2E

SHELTERBELTS
Moisture Regime of Southern Chernozem Within Shelterbelts, (Rezhim vlazhnosti yuzhnogo chernozema v sisteme lesnykh polos),
W74-02302 2G

SHORE PROTECTION
Approaches to State Coastal Management,
W74-02185 2L

Bulletin and Summary of Research Progress Fiscal Years 1970-71.
W74-02647 2L

SILICA
Occurrence of Silica in the Natural Waters of the Huntley-Robertson District, Southern New South Wales,
W74-02555 2K

SILTING
Determination of the Mechanical Compatibility of Porous Rocks with Waste Water in its Subsurface Disposal,
W74-02165 5B

SIMAZINE
Influence of Herbicides on Microbiological Conditions,
W74-02548 5B

SIMULATION ANALYSIS
Two Environmental Analyses Involving Agriculture,
W74-02166 5B

Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

Computer Simulation of Storm Water Runoff,
W74-02310 2E

Dam-Break Flood in a Prismatic Dry Channel,
W74-02311 8B

Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

SIOUX FALLS (S DAK)
Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

SKIMMING
Oil Skimming Apparatus,
W74-02491 5G

Water Pollution Control,
W74-02495 5G

SKOKOMISH INDIAN RESERVATION (WASH)
Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

SLOPES
Slope Aspect and Tunnel Erosion in the Loess of Banks Peninsula, New Zealand,
W74-02288 2J

SLUDGE DISPOSAL
Dry Activated Sludge as Fertilizer for Winter Wheat and Corn, (Sukhoi aktivnyi il kak udobrenie dlya posevov ozimi pshenits' i kukuruz'),
W74-02270 5D

Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

SLUDGE TREATMENT
Mathematical Relationships of BOD Removal in Activated Sludge Process,
W74-02176 5D

Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological Institute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

Water-Treatment-Sludge Filtration Studies,
W74-02440 5D

SMALL WATERSHEDS
Two Environmental Analyses Involving Agriculture,
W74-02166 5B

Calibrating A Water Yield Model for Small Ungaged Watersheds,
W74-02172 2A

The Ex Post Measurement of Benefits and Costs in Small Watershed Projects,
W74-02212 6B

Annual Compilation and Analysis of Hydrologic Data for Little Elm Creek, Trinity River Basin, Texas, 1971,
W74-02477 2E

Annual Compilation and Analysis of Hydrologic Data for Calaveras and Escondido Creeks, San Antonio River Basin, Texas, 1971,
W74-02478 2E

SNAILS
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Tritylmorpholine Association (In French),
W74-02226 5C

SNAKE RIVER FAN (IDAHO)
Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

SNOW
Experience in a Quantitative Assessment of Organization of Snow Cover as a Natural System (Opyt kolichestvennoy otsenki organizatsii snezhnogo pokrova kak prirodnoy sistemy),
W74-02613 2C

SNOW COVER
Use of ERTS Data for Mapping Snow Cover in the Western United States,
W74-02603 7B

Evaluation of ERTS Imagery for Mapping and Detection of Changes of Snowcover on Land and on Glaciers,
W74-02604 7B

Experience in a Quantitative Assessment of Organization of Snow Cover as a Natural System (Opyt kolichestvennoy otsenki organizatsii snezhnogo pokrova kak prirodnoy sistemy),
W74-02613 2C

SNOW FENCES
Evaporation from Snowdrifts Under Oasis Conditions,
W74-02183 2D

SNOW MANAGEMENT
Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

SNOW MECHANICS
Hyperbolic Stress Equations for Compressible Slabs,
W74-02624 2C

SNOW SURVEYS
Use of ERTS Data for Mapping Snow Cover in the Western United States,
W74-02603 7B

SNOWFALL
Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

SNOWPACKS
Evaporation from Snowdrifts Under Oasis Conditions,
W74-02183 2D

Evaluation of ERTS Imagery for Mapping and Detection of Changes of Snowcover on Land and on Glaciers,
W74-02604 7B

Hyperbolic Stress Equations for Compressible Slabs,
W74-02624 2C

SODIUM COMPOUNDS
Sodium Recovery from a Pulp Mill Waste Effluent by Ion Exchange,
W74-02259 5D

SOIL ANALYSIS
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

SOIL CHEMICAL PROPERTIES
Factors Affecting the Manganese Status in Soils of the U.A.R.,
W74-02200 2G

SOIL CONSERVATION
Soil and Water Conservation Districts.
W74-02537 6E

SOIL CONTAMINATION
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

SOIL CONTAMINATION EFFECTS
Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

SOIL DISPOSAL FIELDS
Dry Activated Sludge as Fertilizer for Winter Wheat and Corn, (Sukhoi aktivnyi il kak udobrenie dlya posevov ozimi pshenits' i kukuruz'),
W74-02270 5D

SOIL EROSION
Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

SOIL MOISTURE
Influence of Soil Structure and Moisture on Nitrification,
W74-02192 2G

Water Regime of Solonchak Solonetzes in Open Areas of Forests in the North Caspian Sea Region, (Vodnyy rezhim solonchakovykh solontsov na polyanakh lesnykh nasazhdeniy Severnogo Prikaspiya),
W74-02301 2G

Moisture Regime of Southern Chernozem Within Shelterbelts, (Rezhim vlazhnosti yuzhnogo chernozema v sisteme lesnykh polos),
W74-02302 2G

An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

Effect of Excess Soil Moisture on Yield and Biochemical Processes in Spring Wheat at Various Stages of Its Development (In Russian),
W74-02325 3F

Evaluation of Soil Moisture Regime in a Watershed,
W74-02355 2G

On Solving the Unsaturated Flow Equation: The Flux-Concentration Relation,
W74-02464 2G

On the Concept and Determination of Critical Soil Moisture,
W74-02546 2G

The Effect of Soil Moisture Upon the Availability of Potassium and its Influence on the Growth of Young Maize Plants (Zea mays L.),
W74-02554 3F

SOIL MOISTURE METERS
Evaluation of Soil Moisture Regime in a Watershed,
W74-02355 2G

SOIL PHYSICS
Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

SOIL STRUCTURE
Influence of Soil Structure and Moisture on Nitrification,
W74-02192 2G

SOIL SURVEYS
General Soils Study: Pearl River, Hancock, Harrison Counties, Mississippi.
W74-02333 2G

SOIL WATER
Influence of the Soil Water Level on Microbial Processes of Pasture and Forest Communities,
W74-02194 2G

SOIL WATER MOVEMENT
Experimental and Predicted Movement of Three Herbicides in a Water-Saturated Soil,
W74-02156 5B

Moisture Regime of Southern Chernozem Within Shelterbelts, (Rezhim vlazhnosti yuzhnogo chernozema v sisteme lesnykh polos),
W74-02302 2G

On Solving the Unsaturated Flow Equation: The Flux-Concentration Relation,
W74-02464 2G

SOIL-WATER-PLANT RELATIONSHIPS
Water Regime of Solonchak Solonetzes in Open Areas of Forests in the North Caspian Sea Region, (Vodnyy rezhim solonchakovykh solontsov na polyanakh lesnykh nasazhdeniy Severnogo Prikaspiya),
W74-02301 2G

SOLAR RADIATION
Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

SOLID WASTES
Regional Water, Sewage, and Solid Waste Districts.
W74-02535 5D

SOLONCHAKS
Water Regime of Solonchak Solonetzes in Open Areas of Forests in the North Caspian Sea Region, (Vodnyy rezhim solonchakovykh solontsov na polyanakh lesnykh nasazhdeniy Severnogo Prikaspiya),
W74-02301 2G

SOLONETZES
Water Regime of Solonchak Solonetzes in Open Areas of Forests in the North Caspian Sea Region, (Vodnyy rezhim solonchakovykh solontsov na polyanakh lesnykh nasazhdeniy Severnogo Prikaspiya),
W74-02301 2G

SOLUTES
Analysis by Means of Gas Bubble Electrification,
W74-02406 2K

SOLVENT EXTRACTIONS
Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

SOLVENT SYSTEMS
Determination of Small Amounts of Uranium After Concentrating Through Extraction and Anionic Exchange in a Solvent Agent System Containing Tri-N-Octylphosphine Oxide. (Bestimmung geringer Uranmengen nach Konzentrierun g durch Extraktion und Anionenaustausch in einem tri-n-octylphoshinoxidhaltigen Losungsmittelsystem),
W74-02434 5A

SORBENTS
Investigation of Sorbents for Removing Oil Spills from Waters,
W74-02636 5G

SOUNDS
Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

Puget Sound Resident Coho Salmon Study,
W74-02639 2L

Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

SOUTH AFRICA
Optimum Design Period for Water Pollution Control Plants,
W74-02222 5D

Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

ERTS-1 Imagery as an Aid to the Definition of the Geotectonic Domains of the Southern African Crystalline Shield,
W74-02563 7B

Monitoring Vegetation Cover on Mine Dumps with ERTS-1 Imagery: Some Initial Results,
W74-02574 7B

SOUTH DAKOTA
Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 5B

Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

A Bill to Authorize the Secretary of the Interior to Construct, Operate, and Maintain the Pollock-Herreid Unit, South Dakota Pumping Division, Missouri River Basin Project, South Dakota.
W74-02529 6E

Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

SPAWNING
The Hydrology of Ten Streams in Western Washington as Related to the Propagation of Several Pacific Salmon Species,
W74-02297 8I

SPECTROPHOTOMETRY
Extraction and Spectrophotometric Determination of Vanadium as a Mixed Ligand Complex of Oxine and Azide,
W74-02362 5A

Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

Analysis of High-Purity Water by Flameless Atomic-Absorption Spectroscopy. Part II. Signal Integration with a Non-Resonance Line Correction System for Spurious Absorption Phenomena,
W74-02385 5A

Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

Anionic Exchange Separations of the Elements that can be Extracted with Tributyl Phosphate. II, (Anionenaustauschtrennungen der mit Tributylphosphat extrahierbaren Elemente. II),
W74-02432 2K

Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

SPECTROSCOPY
Detection of Pollutants in Water by Raman Spectroscopy,
W74-02164 5A

Surface Quality Assessment of Natural Bodies of Water,
W74-02181 5A

Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

SPINACH
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

SPORT FISHERY
The Demand for and Value of the Sport Fishery on the Au Sable, Jordan, and Red Cedar Rivers,
W74-02204 6B

SPORT FISHING
Economic Evaluation of the Sport Fishery of the Au Sable River, Michigan,
W74-02203 6B

SPRING WATERS
Kelly V. Alpstetten Association, Inc. (Action to Enjoin Termination of Water Service, Wherein Defendant Counterclaimed for Back Charges).
W74-02532 6E

SPRINKLER IRRIGATION
Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

STANDARDS
A Summary Analysis of Nineteen Tests of Proposed Evaluation Procedures on Selected Water and Land Resource Projects.
W74-02188 6B

STATE GOVERNMENTS
Approaches to State Coastal Management,
W74-02185 2L

Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

Yoffe V. Special Board, Chapter 387, (State Denial of License to Exploit Natural Resources of a Lake Bed).
W74-02514 6E

STATE WATER PLAN (N MEX)
State Water Plan,
W74-02457 6B

Population Projectsions for the New Mexico State Water Plan,
W74-02458 6B

STATISTICAL METHODS
Probability Analysis in an Approximate Theory of Movement of Water Masses, (Veroyatnostnyy analiz v priblizhennoy teorii peremeshcheniya vodnykh mass),
W74-02305 2E

Experience in a Quantitative Assessment of Organization of Snow Cover as a Natural System (Opyt kolichestvennoy otsenki organizatsii snezhnogo pokrova kak prirodnoy sistemy),
W74-02613 2C

STATISTICAL MODELS
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

STATUTES
Levees and Drains--Change of Water-Courses.
W74-02536 6E

STEEL INDUSTRY
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

STEROLS
Chemistry of Marine Natural Products,
W74-02189 5B

STOCHASTIC PROCESSES
Input Specifications to Stochastic Decision Models,
W74-02209 2E

STORAGE
An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

STORM DRAINS
Urban Storm Drainage Activities in New York,
W74-02171 4A

STORM RUNOFF
Computer Simulation of Storm Water Runoff,
W74-02310 2E

Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Houston, Texas Metropolitan Area, 1971,
W74-02471 2E

Genova V. City of Kansas City (Nuisance Action Brought by Landowner Against City for Damage to Property Allegedly Caused by Flow of Surface Waters from City-Owned Cemetery).
W74-02519 6E

STORMS
Storm Rainfall in the Carpathians in June 1969,
W74-02606 2B

Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

STREAM GAGES
Monitoring of Streamflow in the Verde River by ERTS-1 Data Collection System (DCS),
W74-02594 7B

Preliminary Analysis of ERTS-Relayed Water-Resources Data in the Delaware River Basin,
W74-02595 7B

STREAM STABILIZATION
Hydrologic Evaluations in Bridge Pier Scour Design,
W74-02309 8B

STREAMFLOW
An Enclosed Weir for Small Streams in Snow Country,
W74-02249 7B

River Regimes in Iran,
W74-02298 2E

STREAMFLOW FORECASTING
Elevation Dependent Model for Estimating Annual Runoff,
W74-02317 2A

STREAMFLOW SYNTHESIS
Input Specifications to Stochastic Decision Models,
W74-02209 2E

STRESS
Hyperbolic Stress Equations for Compressible Slabs,
W74-02624 2C

STRIP MINES
Digital Analysis of Potomac River Basin ERTS Imagery: Sedimentation Levels at the Potomac-Anacostia Confluence and Strip Mining in Allegheny County, Maryland,
W74-02583 7B

STRIP MINING
ERTS-1 Investigation of Ecological Effects of Strip Mining in Eastern Ohio,
W74-02572 7B

The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

STRONTIUM
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

STRONTIUM-90
Some Regularities of Sr90 Accumulation in the Body of a Rat with a High Fluorine Content in Its Drinking Water, (In Russian),
W74-02195 5C

Accumulation of Strontium and Calcium in Freshwater Fishes of Japan,
W74-02197 5C

STRUCTURAL GEOLOGY
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

Recognition of Surface Lithologic and Topographic Patterns in Southwest Colorado with ADP Techniques,
W74-02562 7B

ERTS-1 Imagery as an Aid to the Definition of the Geotectonic Domains of the Southern African Crystalline Shield,
W74-02563 7B

New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

Structural Lineaments of Gaspe from ERTS Imagery,
W74-02565 7B

Lineaments in Coastal Plain Sediments as Seen in ERTS Imagery,
W74-02566 7B

Structural Interpretations Based on ERTS-1 Imagery, Bighorn Region, Wyoming-Montana,
W74-02568 7B

Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

A New Fault Lineament in Southern California,
W74-02570 7B

Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

SUBMERGED LANDS
State V. Placid Oil Company (Action by State to Establish Its Ownership of Submerged Lands).
W74-02534 6E

Submerged Lands.
W74-02540 6E

SUBSURFACE DRAINAGE
A Self-Draining Subsurface Rainfall Conservation System: Its Effect on the Soil Water Status and Productivity of Coastal Plains Sands,
W74-02193 2G

SUCCESSION
Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

SUDAN
Application and Consequences of Precipitation Observations in the Republic of Sudan in View of the Nomadic Life and Economy,
W74-02348 2B

SULFITE LIQUORS
Sodium Recovery from a Pulp Mill Waste Effluent by Ion Exchange,
W74-02259 5D

SUPERNATANT FLUID
Effect of Supernatant Fluid of the Ankistro-Desmus braunii Brunnth Culture on Development of Algae in Waste Waters of the Chernigov Chemical Fiber Industrial Group, (In Ukrainian),
W74-02245 5C

SURFACE DRAINAGE
Camden Special Road District of Ray County V. Taylor, (Action by Special Road District for Mandatory Injunction Compelling Landowners to Remove Levy and to Permanently Enjoin them from Constructing Levy).
W74-02523 6E

SURFACE RUNOFF
Genova V. City of Kansas City (Nuisance Action Brought by Landowner Against City for Damage to Property Allegedly Caused by Flow of Surface Waters from City-Owned Cemetery).
W74-02519 6E

SURFACE WATERS
Migration of Substances with Surface and Gravitational Waters in Soils of Geochemically Related Landscapes of Baraba, (Migratsiya veshchestv s pverkhnostnymi i gravitatsionnymi vodami v pochvakh geokhimicheski sopryazhennykh landshaftov Baraby),
W74-02300 2G

Nitrogen, Phosphorus, and Trace Elements in Florida Surface Waters, 1970-71,
W74-02476 5A

Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

Chemical Characteristics of Surface Waters in the Upper Chirchik River Basin (Khimicheskaya kharakteristika poverkhnostnykh vod verkhney chasti basseyna r. Chirchik),
W74-02612 2K

Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

SURFACE WAVES
Surface and Internal Waves, (Poverkhnostnyye i vnutrenniye volny),
W74-02299 2E

SURFACES
Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

SURVEYS
Evaluation of Commercial Utility of ERTS-A Imagery in Structural Reconnaissance for Minerals and Petroleum,
W74-02567 7B

Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

Polluted and Turbid Water Masses in Osaka Bay and Its Vicinity Revealed with ERTS-A Imageries,
W74-02586 7B

Red Tide in Ise Bay,
W74-02587 7B

SUSPENDED SOLIDS
Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

Method for Removing Suspended Solids from Liquids,
W74-02484 5D

SWEDEN
Hylte Bruk: Newsprint and Environmental Protection, (Hylte Bruk: Zeitungsdruckpapier and Umweltschultz).
W74-02256 5D

SWITZERLAND
Salt, a Little-Known Aggressor in Our Environment, (In French),
W74-02199 5B

SYNTHETIC FIBERS
Effluent Treatment at Man-Made Fibre Production Units,
W74-02263 5D

SYNTHETIC HYDROLOGY
Input Specifications to Stochastic Decision Models,
W74-02209 2E

SYSTEMS ANALYSIS
Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

Water Resources Development in the Mullica River Basin,
W74-02450 5C

TAMPA BAY AREA (FLA)
Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

TANNERY WASTES
Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

TANTALUM FILAMENT ATOMIZER
Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

TELEMETRY
Monitoring of Streamflow in the Verde River by ERTS-1 Data Collection System (DCS),
W74-02594 7B

Preliminary Analysis of ERTS-Relayed Water-Resources Data in the Delaware River Basin,
W74-02595 7B

TEMPERATURE
Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

A Hydrogeothermal Description of Groundwater in Upper Cretaceous Deposits in the Southeast Aral Sea Area (Gidrogeotermicheskaya kharakteristika podzemnykh vod verkhnego mela Yugo-Vostochnogo Priaral'ya),
W74-02609 2F

TENNESSEE
The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

TERRAIN ANALYSIS
Aerial Remote Sensing of Carbonate Terranes in Shelby County, Alabama,
W74-02467 7B

Recognition of Surface Lithologic and Topographic Patterns in Southwest Colorado with ADP Techniques,
W74-02562 7B

TERTIARY TREATMENT
Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

TESTING
A Summary Analysis of Nineteen Tests of Proposed Evaluation Procedures on Selected Water and Land Resource Projects.
W74-02188 6B

TEXAS
Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

City of Austin, Texas, Study of Wastewater Collection System: Phase I.
W74-02330 5D

Metropolitan Water and Sewer Plan, Lubbock Metropolitan Council of Governments.
W74-02331 3D

Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Houston, Texas Metropolitan Area, 1971,
W74-02471 2E

Annual Compilation and Analysis of Hydrologic Data for Little Elm Creek, Trinity River Basin, Texas, 1971,
W74-02477 2E

Annual Compilation and Analysis of Hydrologic Data for Calaveras and Escondido Creeks, San Antonio River Basin, Texas, 1971,
W74-02478 2E

Coleman V. Forister (Suit to Establish Right of Use of Land for Ingress and Egress to Creek Waterfront).
W74-02517 6E

Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

Annual Compilation and Analysis of Hydrologic Data for Green Creek, Brazos River Basin, Texas, 1971,
W74-02626 4D

TEXTILE INDUSTRY
Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

TEXTILES
Effluent Treatment at Man-Made Fibre Production Units,
W74-02263 5D

THAWING
Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

THERMAL PLUME
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

THERMAL POLLUTION
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

The Use of Power Plant Heat in a Physical-Chemical Domestic Wastewater Renovation System,
W74-02208 5D

Studies of the Sinking Plume Phenomenon,
W74-02644 5C

THERMAL POWER
Effect of a Cinder Settling Tank of a Thermal Electric Power Plant on the Quality of Subsurface Waters, (In Russian),
W74-02231 5B

THERMOCOUPLE PSYCHROMETERS
Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

THIN LAYER CHROMATOGRAPHY
Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

TILAPIA-RENDALLI
Comparative Biology of Tilapia rendalli (Boulenger) (Pisces cichlidae) in Lake Itasy and Lake Mantasoa, (In French),
W74-02344 2H

TOMBIGBEE RIVER (MISSISSIPPI)
Tombigbee River Valley Water Management District, Tenth Annual Report.
W74-02332 6B

TOPOGRAPHY
Elevation Dependent Model for Estimating Annual Runoff,
W74-02317 2A

TOTAL NITROGEN
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

TOTAL ORGANIC CARBON
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

TOTAL OXYGEN DEMAND
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

TOXAPHENE
Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

TOXICITY
Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

TOXICITY

Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

TRACE ELEMENTS

Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

Nitrogen, Phosphorus, and Trace Elements in Florida Surface Waters, 1970-71,
W74-02476 5A

TRACE LEVELS

Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

TRACERS

Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

TRANSPIRATION

A Study of Items in the Groundwater Balance of Waterlogged Areas (Ob uzuchenii elementov balansa gruntovykh vod no zabolochennykh uchastkakh),
W74-02610 2D

TRAVELTIME

Probability Analysis in an Approximate Theory of Movement of Water Masses, (Veroyatnostnyy analiz v priblizhennoy teorii peremeshcheniya vodnykh mass),
W74-02305 2E

TREATMENT FACILITIES

Optimum Design Period for Water Pollution Control Plants,
W74-02222 5D

Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

Color Removal from Kraft Pulp Mill Effluents by Massive Lime Treatment,
W74-02284 5D

Regional Wastewater Facilities Study.
W74-02338 5D

The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

TREES

Moisture Regime of Southern Chernozem Within Shelterbelts, (Rezhim vlazhnosti yuzhnogo chernozema v sisteme lesnykh polos),
W74-02302 2G

TRICKLE IRRIGATION

Trickle Irrigation on Cotton,
W74-02347 3F

TRIEN

Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

TRINITY RIVER BASIN (TEX.)

Annual Compilation and Analysis of Hydrologic Data for Little Elm Creek, Trinity River Basin, Texas, 1971,
W74-02477 2E

TROPHIC LEVEL

Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

TROPICAL STORMS

Hurricane Agnes Floods East Mahantango Creek,
W74-02174 2E

TSUNAMIS

Surface and Internal Waves, (Poverkhnostnyye i vnutrenniye volny),
W74-02299 2E

TUNNEL EROSION

Slope Aspect and Tunnel Erosion in the Loess of Banks Peninsula, New Zealand,
W74-02288 2J

TURBIDITY

Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

Remote Sensing of Turbidity Plumes in Lake Ontario,
W74-02601 7B

TURBULENCE

Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

ULTRASONICS

Ultrasonic River Flow Measurement,
W74-02250 2E

ULTRAVIOLET RADIATION

Optical Constants of Water in the 200-nm to 200-Micrometer Wavelength Region,
W74-02167 2K

UNITED ARAB REPUBLIC

Factors Affecting the Manganese Status in Soils of the U.A.R.,
W74-02200 2G

UNITED ARAB REPUBLIC (LAKE MARIUT)

Quantitative Estimation of Bottom Fauna in Lake Mariut,
W74-02549 2H

UNITED KINGDOM (SOUTH WINTERBOURNE)

The Chemical Composition and Flow of the South Winterbourne in Dorset,
W74-02190 2K

UNITED KINGDOM (THAMES RIVER)

Ultrasonic River Flow Measurement,
W74-02250 2E

UNITED REPUBLIC OF TANZANIA

Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

UNITED STATES

Selected References, Ground-Water Contamination, The United States of America and Puerto Rico.
W74-02482 5B

River Basin Monetary Authorizations--Disaster Relief Act Amendments.
W74-02516 6E

Environmental Protection Act of 1973, First Session on S.1104.
W74-02518 6E

A Bill to Prescribe Procedures so as to make Administration of the National Environmental Policy Act of 1969 More Effective.
W74-02528 6E

Submerged Lands.
W74-02540 6E

UNSATURATED FLOW

Saturated-Unsaturated Seepage by Finite Elements,
W74-02313 2G

On Solving the Unsaturated Flow Equation: The Flux-Concentration Relation,
W74-02464 2G

UNSTEADY FLOW

A New Oscillating Water Tunnel,
W74-02160 2J

A Shear Plate for Use in Oscillatory Flow,
W74-02161 2E

URANIUM

Determination of Small Amounts of Uranium After Concentrating Through Extraction and Anionic Exchange in a Solvent Agent System Containing Tri-N-Octylphosphine Oxide. (Bestimmung geringer Uranmengen nach Konzentrierun g durch Extraktion und Anionenaustausch in einem tri-n-octylphoshinoxidhaltigen Losungsmittelsystem),
W74-02434 5A

URBAN DRAINAGE

Urban Storm Drainage Activities in New York,
W74-02171 4A

Genova V. City of Kansas City (Nuisance Action Brought by Landowner Against City for Damage to Property Allegedly Caused by Flow of Surface Waters from City-Owned Cemetery).
W74-02519 6E

URBAN HYDROLOGY
Computer Simulation of Storm Water Runoff,
W74-02310 2E

Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Houston, Texas Metropolitan Area, 1971,
W74-02471 2E

URBAN LANDSCAPES
A Study of Water Used on Urban Landscapes,
W74-02459 6B

URBAN RUNOFF
Water Quality Characteristics of Storm Sewer Discharges and Combined Sewer Overflows,
W74-02345 5B

URBANIZATION
City of Austin, Texas, Study of Wastewater Collection System: Phase I.
W74-02330 5D

A Study of Water Used on Urban Landscapes,
W74-02459 6B

UREA
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Tritylmorpholine Association (In French),
W74-02226 5C

UREAS
An Automated Analysis for Urea in Seawater,
W74-02421 5A

URINE
The Determination of Methyl Mercury in Urine,
W74-02387 5A

UROCHROME
Cleanliness of Wells, Chemical Substances in Drinking Water and Their Relation to Caries (In Polish),
W74-02544 5C

URUGUAY
Agroclimatic Areas for Wheat and Bioclimatic Characteristics of its Cultivars in Uruguay, (In Spanish),
W74-02354 3F

USER RELATED STUDY
User Related Study of Three Michigan Rivers,
W74-02202 6B

USSR
Using the Adsorption Method on Activated Charcoal with Chloroform Extraction (CCE) for Evaluating Water Pollution by Organic Substances, (In Russian),
W74-02232 5B

Effect of Supernatant Fluid of the Ankistro-Desmus braunii Brunnth Culture on Development of Algae in Waste Waters of the Chernigov Chemical Fiber Industrial Group, (In Ukrainian),
W74-02245 5C

Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

Storm Rainfall in the Carpathians in June 1969,
W74-02606 2B

Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

A Hydrogeothermal Description of Groundwater in Upper Cretaceous Deposits in the Southeast Aral Sea Area (Gidrogeotermicheskaya kharakteristika podzemnykh vod verkhnego mela Yugo-Vostochnogo Priaral'ya),
W74-02609 2F

A Study of Items in the Groundwater Balance of Waterlogged Areas (Ob uzuchenii elementov balansa gruntovykh vod no zabolochennykh uchastkakh),
W74-02610 2D

Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

Chemical Characteristics of Surface Waters in the Upper Chirchik River Basin (Khimicheskaya kharakteristika poverkhnostnykh vod verkhney chasti basseyna r. Chirchik),
W74-02612 2K

Experience in a Quantitative Assessment of Organization of Snow Cover as a Natural System (Opyt kolichestvennoy otsenki organizatsii snezhnogo pokrova kak prirodnoy sistemy),
W74-02613 2C

Bear Glacier Has Come Alive (Lednik Medvezhiy ozhil),
W74-02614 2C

USSR (AZERBAYDZHAN)
Contribution to the Study of Zooplankton and Zoobenthos in the Mingechaur Reservoir, (In Russian),
W74-02341 2H

USSR (BARABA LOWLANDS)
Migration of Substances with Surface and Gravitational Waters in Soils of Geochemically Related Landscapes of Baraba, (Migratsiya veshchestv s pverkhnostnymi i gravitatsionnymi vodami v pochvakh geokhimicheski sopryazhennykh landshaftov Baraby),
W74-02300 2G

USSR (KAIBYSHEV RESERVOIR)
The Ability of Bacteria to Mineralize Algae Organic Matter, (In Russian),
W74-02252 5B

USSR (KAIRAK-KUM RESERVOIR)
Microflora and Chemical Composition of the Bottom Deposits of the Kairak-Kum Reservoir, (In Russian),
W74-02253 5B

USSR (KARSHI STEPPE)
Grasshoppers and Crickets in the Karshi Steppe, (In Russian),
W74-02239 3F

USSR (KOKCHETAV OBLAST)
Moisture Regime of Southern Chernozem Within Shelterbelts, (Rezhim vlazhnosti yuzhnogo chernozema v sisteme lesnykh polos),
W74-02302 2G

USSR (KONAKOV)
Effect of Heated Water from Konakov Hydro-Electric Station on Oxygen Content and Development of Phytoplankton in Ivan'Kovskoe Reservoir During Winter, (In Russian),
W74-02244 5B

USSR (KUIBYSHEV RESERVOIR)
The Age Group Distribution of Pelobates fuscus (Laur.) at the Kuibyshev Reservoir Shores (In Russian),
W74-02641 2H

USSR (NORTH CASPIAN SEA REGION)
Water Regime of Solonchak Solonetzes in Open Areas of Forests in the North Caspian Sea Region, (Vodnyy rezhim solonchakovykh solontsov na polyanakh lesnykh nasazhdeniy Severnogo Prikaspiya),
W74-02301 2G

USSR (RYBINSK STORAGE LAKE)
The Prospects of Using the Rybinsk Water Storage Basin for Fisheries, (In Russian),
W74-02241 8I

USSR (SHELON' RIVER BASIN)
An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

USSR (TASKENT)
Lake Sary-Chelek and its Zooplankton, (In Russian),
W74-02261 2H

USSR (TAVDA)
Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

USSR (VARUARA RESERVOIR)
Seasonal Variations in the Qualitative and Quantitative Composition of Young Fish Populations in the Varvara Reservoir, (In Russian),
W74-02560 2H

USSR (WEST SIBERIA)
Phytoindication of Saline Ground in Drying Up Shallow Lakes, (In Russian),
W74-02559 2H

VAL VERDE COUNTY (TEX)
Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

VANADIUM
Extraction and Spectrophotometric Determination of Vanadium as a Mixed Ligand Complex of Oxine and Azide,
W74-02362 5A

VANADIUM

Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

VEGETATION
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

Use of the Sri Electronic Satellite Image Analysis Console for Mapping Southern Arizona Plant Communities from ERTS-1 Imagery,
W74-02593 7B

VERDE RIVER (ARIZ)
Monitoring of Streamflow in the Verde River by ERTS-1 Data Collection System (DCS),
W74-02594 7B

VERMONT
Regional Wastewater Facilities Study.
W74-02338 5D

Kelly V. Alpstetten Association, Inc. (Action to Enjoin Termination of Water Service, Wherein Defendant Counterclaimed for Back Charges).
W74-02532 6E

VIRUSES
Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

VOLTAMMETRIC DETECTOR
Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

VOLUMETRIC ANALYSIS
Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

Analysis by Means of Gas Bubble Electrification,
W74-02406 2K

WALTON COUNTY (GEO)
A Water and Sewer Plan: Walton County, Georgia.
W74-02337 5D

WASHINGTON
The Hydrology of Ten Streams in Western Washington as Related to the Propagation of Several Pacific Salmon Species,
W74-02297 8I

Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

Puget Sound Resident Coho Salmon Study,
W74-02639 2L

WASTE DISPOSAL
Two Environmental Analyses Involving Agriculture,
W74-02166 5B

WASTE DISPOSAL WELLS
Determination of the Mechanical Compatibility of Porous Rocks with Waste Water in its Subsurface Disposal,
W74-02165 5B

WASTE DUMPS
Monitoring Vegetation Cover on Mine Dumps with ERTS-1 Imagery: Some Initial Results,
W74-02574 7B

WASTE IDENTIFICATION
Characterization of Waste Effluents from a Commercial Pimento Canning Operation,
W74-02379 5A

WASTE MANAGEMENT
The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

WASTE WATER DISPOSAL
Water Quality Management in Groundwater Basins,
W74-02356 5B

WASTE WATER TREATMENT
Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

Mathematical Relationships of BOD Removal in Activated Sludge Process,
W74-02176 5D

Cost Effectiveness in Pollution Control--Treatment of Glue Factory Wastes by Carbon Adsorption System,
W74-02177 5D

In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

The Use of Power Plant Heat in a Physical-Chemical Domestic Wastewater Renovation System,
W74-02208 5D

Manufacture of Capacitor Paper -- Some Problems with Fresh Water Preparation, (Erzeugung von Kondensatorpapier -- einige Probleme bei der Frischwasserherstellung),
W74-02247 5D

Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

Hylte Bruk: Newsprint and Environmental Protection, (Hylte Bruk: Zeitungsdruckpapier and Umweltschultz).
W74-02256 5D

Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological Institute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

Sodium Recovery from a Pulp Mill Waste Effluent by Ion Exchange,
W74-02259 5D

Characterization and Treatment of Fish Processing Plant Effluents in Canada,
W74-02262 5D

Effluent Treatment at Man-Made Fibre Production Units,
W74-02263 5D

Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

In-Pipe Wastewater Cleanup.
W74-02269 5D

Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

(TAPPI) Environmental Conference, May 14-16, 1973.
W74-02273 5D

The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

Advanced Practical Water Recycle in Tissue Manufacture,
W74-02279 5D

Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

Color Removal from Kraft Pulp Mill Effluents by Massive Lime Treatment,
W74-02284 5D

Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

Fourth Annual Report, City of Carbondale, Illinois, Water and Wastewater Treatment.
W74-02328 5D

Survey of Methods of Treating Wine and Grape Waste Water,
W74-02329 5D

Metropolitan Water and Sewer Plan, Lubbock Metropolitan Council of Governments.
W74-02331 3D

Regional Wastewater Facilities Study.
W74-02338 5D

Water-Treatment-Sludge Filtration Studies,
W74-02440 5D

Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

Method for Removing Suspended Solids from Liquids,
W74-02484 5D

Nitrification of BOD-Containing Water,
W74-02485 5D

Method and Apparatus for Electrolytic Treatment of Sewage,
W74-02486 5D

Process for Removal of Contaminants from Wastes,
W74-02487 5D

Sewage Treatment Apparatus,
W74-02489 5D

Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

WATER ALLOCATION (POLICY)

Evolving Water Policy and Management in the United States,
W74-02358 6B

WATER ANALYSIS

Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

Printout Colorimeter for Autoanalysis of Water Pollution,
W74-02374 5A

A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

The Spreading of Heavy Metals in Flowing Waters in the Region of Occurrence of Natural Deposits and of the Zinc and Lead Industry. (Rozprzestrzenienie metali ciezkich w wodach plynacych w rejonie wystepowania naturalnych zloz oraz przemyslu cynku i olowiu),
W74-02435 5B

A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

WATER BALANCE

Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

The Water Balance of New Zealand,
W74-02291 2A

Water-Balance Method and Its Practical Importance, (Metod vodnogo balansa i yego prakticheskoye znacheniye),
W74-02308 2A

Combined Heat, Ice and Water Balances at Selected Glacier Basins. Part II: Specifications, Standards and Data Exchange.
W74-02470 2C

WATER BRAKE

Analysis of Internal Flow Characteristics of a Smooth-Disk Water-Brake Dynamometer,
W74-02475 8C

WATER CHEMISTRY

Comparing the Quality of Our Waters,
W74-02428 5A

A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

Chemical Characteristics of Surface Waters in the Upper Chirchik River Basin (Khimicheskaya kharakteristika poverkhnostnykh vod verkhney chasti basseyna r. Chirchik),
W74-02612 2K

WATER COOLING

Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

WATER DEMAND

Population Projectsions for the New Mexico State Water Plan,
W74-02458 6B

WATER DISTRIBUTION

Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

WATER HARVESTING

A Way to Make the Desert Green,
W74-02346 3B

WATER-IN-OIL EMULSTIONS

The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

WATER LAW

Segars V. Cornwell (Property Owner Sues for Malicious Prosecution Against Corporation).
W74-02527 6E

Legal and Institutional Constraints in Consolidating Irrigation Systems,
W74-02533 3F

WATER MANAGEMENT (APPLIED)

Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

Evolving Water Policy and Management in the United States,
W74-02358 6B

WATER POLLUTION

System for Monitoring Contaminants in Liquids,
W74-02493 5A

Challenges to Federalism: State Legislation Concerning Marine Oil Pollution,
W74-02502 5G

Groundwater Pollution in the Western States--Private Remedies and Federal and State Legislation,
W74-02506 5G

U.S. V. American Cyanamid Company (Action for Discharge into Navigable Waterways).
W74-02522 6E

Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

Polluted and Turbid Water Masses in Osaka Bay and Its Vicinity Revealed with ERTS-A Imageries,
W74-02586 7B

WATER POLLUTION CONTROL

Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

Optimum Design Period for Water Pollution Control Plants,
W74-02222 5D

Cost Effectiveness of Current Environmental Engineering Practices,
W74-02225 5D

U.S. V. American Cyanamid Company (Action for Discharge into Navigable Waterways).
W74-02522 6E

WATER POLLUTION EFFECTS

Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

Some Chemical and Biological Characteristics of the Mississippi River Bordering Iowa,
W74-02363 5B

WATER POLLUTION EFFECTS

Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

WATER POLLUTION SOURCES

A Study of Factors Influencing the Nitrogen and Phosphorus Contents of Nebraska Waters,
W74-02151 5B

Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

Problems with Colored Papers: Are They a Cause of Pollution, (Probleme mit farbigen Papieren: Sind sie eine Ursache von Verschmutzung),
W74-02255 5B

Effluent Treatment at Man-Made Fibre Production Units,
W74-02263 5D

Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

Water Quality Characteristics of Storm Sewer Discharges and Combined Sewer Overflows,
W74-02345 5B

The Spreading of Heavy Metals in Flowing Waters in the Region of Occurrence of Natural Deposits and of the Zinc and Lead Industry. (Rozprzestrzenienie metali ciezkich w wodach plynacych w rejonie wystepowania naturalnych zloz oraz przemyslu cynku i olowiu),
W74-02435 5B

Uptake of Mercury by Fish in Natural and Artificial Systems,
W74-02460 5B

Evaluation of Nitrate Content of Ground Water in Hall County, Nebraska,
W74-02465 5B

Selected References, Ground-Water Contamination, The United States of America and Puerto Rico.
W74-02482 5B

A Report on Bacterial Pollution Affecting Shellfish Harvesting in Newport River, North Carolina.
W74-02621 5B

Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

Studies of the Sinking Plume Phenomenon,
W74-02644 5C

WATER PROPERTIES

Optical Constants of Water in the 200-nm to 200-Micrometer Wavelength Region,
W74-02167 2K

Comparing the Quality of Our Waters,
W74-02428 5A

Chemical Characteristics of Surface Waters in the Upper Chirchik River Basin (Khimicheskaya kharakteristika poverkhnostnykh vod verkhney chasti basseyna r. Chirchik),
W74-02612 2K

WATER QUALITY

Effects of Highway Bridge Construction on a Subarctic Stream,
W74-02295 4C

Water Resources of Lee County, Mississippi,
W74-02340 4B

Water Quality Characteristics of Storm Sewer Discharges and Combined Sewer Overflows,
W74-02345 5B

Groundwater Exploration and Provision from the Hydrogeological Point of View,
W74-02353 4B

Water Quality Management in Groundwater Basins,
W74-02356 5B

Some Chemical and Biological Characteristics of the Mississippi River Bordering Iowa,
W74-02363 5B

Comparing the Quality of Our Waters,
W74-02428 5A

Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

Multi-Stage Flash Evaporator,
W74-02490 3A

System for Monitoring Contaminants in Liquids,
W74-02493 5A

Legal Developments in Canadian Water Management,
W74-02505 6E

Debrecen Area Inland Waters: Hydrobiological Approach: Influence on Water Quality of Main Eastern Irrigation Canal with Reference to Debrecen's Drinking and Industrial Water Supply,
W74-02543 5C

Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

Chemical Characteristics of Surface Waters in the Upper Chirchik River Basin (Khimicheskaya kharakteristika poverkhnostnykh vod verkhney chasti basseyna r. Chirchik),
W74-02612 2K

Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

Research Pertinent to Environmental Quality Concerning the Period, 1967-1971.
W74-02648 2L

WATER QUALITY ACT

Michigan State Water Pollution Control Plan.
W74-02511 5G

WATER QUALITY CONTROL

Michigan State Water Pollution Control Plan.
W74-02511 5G

Public Water Supplies--Chlorination.
W74-02538 5G

Electrochemical Flotation: Concept for Removing Oil from Water,
W74-02634 5D

Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

WATER QUALITY CONTROL SYSTEMS

Optimization of Industrial Systems with the Separable Programming and the Generalized Reduced Gradient Methods,
W74-02213 5G

WATER RESOURCES

Water Resources of Lee County, Mississippi,
W74-02340 4B

Use of Systems Approaches in Planning Israel's Water Resources Management,
W74-02352 6A

California High Water, 1970-1971,
W74-02474 2E

Hydrogeology of Closed Basins and Deserts of South America, ERTS-1 Interpretations,
W74-02588 7B

Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

WATER RESOURCES DEVELOPMENT

Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

Tombigbee River Valley Water Management District, Tenth Annual Report.
W74-02332 6B

The Balance of Surface Water Resources in the Lower Mesopotamian Valley,
W74-02350 6B

Evaluation of the Regional Multipurpose Economic Benefits Resulting From a Water and Related Land Resource Development,
W74-02439 6B

Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

State Water Plan, Proceedings of 18th Annual New Mexico Water Conference.
W74-02456 6B

State Water Plan,
W74-02457 6B

Population Projectsions for the New Mexico State Water Plan,
W74-02458 6B

Another Rio Grande for New Mexico,
W74-02461 3A

Report by the National Water Commission--A Review,
W74-02463 6B

Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

Applications of Multispectral Imagery to Water Resources Development Planning in the Lower Mekong Basin (Khemer Republic, Laos, Thailand and Viet-Nam),
W74-02590 7B

Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

WATER RESOURCES PLANNING ACT
State Water Plan,
W74-02457 6B

WATER REUSE
Two Environmental Analyses Involving Agriculture,
W74-02166 5B

Advanced Practical Water Recycle in Tissue Manufacture,
W74-02279 5D

Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

WATER RIGHTS
Kelly V. Alpstetten Association, Inc. (Action to Enjoin Termination of Water Service, Wherein Defendant Counterclaimed for Back Charges).
W74-02532 6E

WATER SAMPLING
An Improved Bottom-Water Sampler,
W74-02410 7B

WATER SUPPLY
Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

A Water and Sewer Plan: Greene County, Georgia.
W74-02334 5D

A Water and Sewer Plan: Morgan County, Georgia.
W74-02335 5D

A Water and Sewer Plan: Madison County, Georgia.
W74-02336 5D

A Water and Sewer Plan: Walton County, Georgia.
W74-02337 5D

Northeast Georgia Area Water and Sewer Systems Plan and Capital Improvement Program.
W74-02339 3D

A Bill to Authorize the Secretary of the Interior to Construct, Operate, and Maintain the Pollock-Herreid Unit, South Dakota Pumping Division, Missouri River Basin Project, South Dakota.
W74-02529 6E

City of Hollywood V. Yarborough (Review of Public Service Commission Order Authorizing Utility to Provide Water Service in Unincorporated Area which Petitioner Claimed to have Exclusive Control Over).
W74-02530 6E

Public Water Supplies--Chlorination.
W74-02538 5G

WATER SUPPLY DEVELOPMENT
Metropolitan Water and Sewer Plan, Lubbock Metropolitan Council of Governments.
W74-02331 3D

Water Resources Development in the Mullica River Basin,
W74-02450 5C

WATER TEMPERATURE
Salinity Corrections for Dissolved Oxygen Measurements,
W74-02424 5A

The Effect of Temperature on the Generation Time of a Bacterial Community in Lake Water,
W74-02557 5B

WATER TREATMENT
Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

Fourth Annual Report, City of Carbondale, Illinois, Water and Wastewater Treatment.
W74-02328 5D

Multi-Stage Flash Evaporator,
W74-02490 3A

Public Water Supplies--Chlorination.
W74-02538 5G

WATER USE
Guidelines for the Coastal Zone.
W74-02510 2L

WATER UTILIZATION
User Related Study of Three Michigan Rivers,
W74-02202 6B

Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

A Study of Water Used on Urban Landscapes,
W74-02459 6B

Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

WATER WELLS
Shallow Ground Water in the Zamin Dawar Area, Helmand Province, Afghanistan,
W74-02472 4B

Cleanliness of Wells, Chemical Substances in Drinking Water and Their Relation to Caries (In Polish),
W74-02544 5C

Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

WATER WORKS
Fourth Annual Report, City of Carbondale, Illinois, Water and Wastewater Treatment.
W74-02328 5D

City of Hollywood V. Yarborough (Review of Public Service Commission Order Authorizing Utility to Provide Water Service in Unincorporated Area which Petitioner Claimed to have Exclusive Control Over).
W74-02530 6E

WATER YIELD
Calibrating A Water Yield Model for Small Ungaged Watersheds,
W74-02172 2A

Shallow Ground Water in the Zamin Dawar Area, Helmand Province, Afghanistan,
W74-02472 4B

WATER YIELD IMPROVEMENT
Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

A Way to Make the Desert Green,
W74-02346 3B

Prescribed Fire Effects on Water Repellency, Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4C

WATERSHED MANAGEMENT
Calibrating A Water Yield Model for Small Ungaged Watersheds,
W74-02172 2A

Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

WATERSHEDS (BASINS)
Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

WATERWAYS
Applicability of the Interceptor Waterway Concept to the Rookery Bay Sanctuary,
W74-02205 4A

WAVES (WATER)
Long Waves in Shallow Triangular Channels,
W74-02158 2E

A New Oscillating Water Tunnel,
W74-02160 2J

A Shear Plate for Use in Oscillatory Flow,
W74-02161 2E

WAVES (WATER)

Two-Dimensional Waves Generated by a Surface Pressure Disturbance Over a Sloping Beach,
W74-02187 2E

Surface and Internal Waves, (Poverkhnostnyye i vnutrenniye volny),
W74-02299 2E

Adjustment of Friction in Hydraulic Models of Lakes,
W74-02314 2H

Damping of Water Waves Over Porous Bed,
W74-02315 2E

Use of ERTS-1 in Coastal Studies,
W74-02633 2L

Wave Breaking in Shallow Water,
W74-02638 2L

Design Considerations for a 3-D Laser Doppler Velocimeter for Studying Gravity Waves in Shallow Water,
W74-02642 2L

Bulletin and Summary of Research Progress Fiscal Years 1970-71.
W74-02647 2L

Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

WEATHER DATA

Predicting Avalanche Intensity from Weather Data: A Statistical Analysis,
W74-02294 2C

WEATHER FORECASTING

Application and Consequences of Precipitation Observations in the Republic of Sudan in View of the Nomadic Life and Economy,
W74-02348 2B

WEATHER MODIFICATION

Weather Modification Operations In California, October 1, 1970-September 30, 1971,
W74-02293 3B

WEATHER PATTERNS

California High Water, 1970-1971,
W74-02474 2E

WEIRS

An Enclosed Weir for Small Streams in Snow Country,
W74-02249 7B

WELL DATA

Use of Digital Computer Techniques in Water Resources Data Storage,
W74-02357 4B

WEST VIRGINIA

Canyon Public Service District V. Tasa Coal Company (Eminent Domain Proceeding Held Public Service District had Right to Condemn Defendant's Lands for Use in Connection with Sewer Facilities, Defendant Appeals) .
W74-02531 6E

Floods at Martinsburg and Vicinity, West Virginia,
W74-02615 2E

WETLANDS

A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast.
W74-02324 4B

Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

Wetland Fill-Restrictions Do Not Constitute a Compensable 'Taking' Within the Meaning of the Fifth Amendment,
W74-02503 4A

Barta V. Brinegar (Civil Actions Brought Against Federal and State Officials Seeking to Enjoin Construction of Highway Segment Until Completion of Environmental Impact Study).
W74-02521 6E

Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

WEYMOUTH RIVER BASIN (MASS.)

Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

WHEAT

Dry Activated Sludge as Fertilizer for Winter Wheat and Corn, (Sukhoi aktivnyi il kak udobrenie dlya posevov ozimi pshenits' i kukuruz'),
W74-02270 5D

Agroclimatic Areas for Wheat and Bioclimatic Characteristics of its Cultivars in Uruguay, (In Spanish),
W74-02354 3F

WHEAT YIELD

Effect of Excess Soil Moisture on Yield and Biochemical Processes in Spring Wheat at Various Stages of Its Development (In Russian),
W74-02325 3F

WILDLIFE

A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast.
W74-02324 4B

WILDLIFE MANAGEMENT

Salmon Falls Division, Upper Snake River Project, Idaho, Part 11.
W74-02515 6E

WILTING POINT

On the Concept and Determination of Critical Soil Moisture,
W74-02546 2G

WINERY WASTES

Survey of Methods of Treating Wine and Grape Waste Water,
W74-02329 5D

WINGRA WATERSHED (WIS)

Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

WINTER

An Enclosed Weir for Small Streams in Snow Country,
W74-02249 7B

WISCONSIN

Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

Wetland Fill-Restrictions Do Not Constitute a Compensable 'Taking' Within the Meaning of the Fifth Amendment,
W74-02503 4A

Barta V. Brinegar (Civil Actions Brought Against Federal and State Officials Seeking to Enjoin Construction of Highway Segment Until Completion of Environmental Impact Study).
W74-02521 6E

Studies of the Sinking Plume Phenomenon,
W74-02644 5C

Sedimentation and Scour Off Nuclear Power Plants,
W74-02645 2J

WITHDRAWAL

Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

WYOMING

Evaporation from Snowdrifts Under Oasis Conditions,
W74-02183 2D

Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

YORK COUNTY (ME.)

Ogunquit Sand Dune Land Stabilization Measure, York County in Maine, Threshold to Maine Resource Conservation and Development Project (Final Environmental Statement).
W74-02504 4A

YUGOSLAVIA (JEZERO LAKE)

Limnological Characteristics of Jezero on the Island of Krk, (In Serbo-Croatian),
W74-02386 2H

ZINC

Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

The Effects of Trace Metals on Ground Water Quality as Influenced by Soils Reflecting Differences in Organic Matter Content and Genetic Conditions,
W74-02211 5B

Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

Iron, Zinc, Magnesium, and Copper Concentrations in Body Meat of the Blue Crab, Callinectes sapidus,
W74-02409 5A

Heavy Metals in the Main Streams of the James River Basin, Missouri,
W74-02445 5A

ZONOCERUS-VARIEGATUS
On the Origin of the Wet-Season Form of Zonocerus variegatus (L.) (Orth., Acrididae) In Southern Nigeria, with Some Biological Notes,
W74-02238 2I

ZOOPLANKTON
Lake Sary-Chelek and its Zooplankton, (In Russian),
W74-02261 2H

Contribution to the Study of Zooplankton and Zoobenthos in the Mingechaur Reservoir, (In Russian),
W74-02341 2H

Some Further Results of the Zooplankton Studies in the Czechslovak-Hungarian Stretch of the Danube,
W74-02545 2I

AUTHOR INDEX

ABBASOV, G. S.
Seasonal Variations in the Qualitative and Quantitative Composition of Young Fish Populations in the Varvara Reservoir, (In Russian),
W74-02560 2H

ABBOTT, M. B.
System 21, 'Jupiter' (A Design System for Two-Dimensional Nearly-Horizontal Flows),
W74-02159 7C

ABDELIN-ZADEH, R.
Calculation of Dose Conversion Factors for 60Co Gamma Radiation in Water, (In German),
W74-02198 5B

ABELE, R. W. JR
Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

ABU EL-SOUOD, S.
Ecological and Phytosociological Study of a Sector in the Lybian Desert,
W74-02507 2I

ACKROYD, E. A.
Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

AGEE, J. K.
Prescribed Fire Effects on Water Repellency, Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4C

AKHMEDOV, I. A.
Contribution to the Study of Zooplankton and Zoobenthos in the Mingechaur Reservoir, (In Russian),
W74-02341 2H

ALEEM, A. A.
Quantitative Estimation of Bottom Fauna in Lake Mariut,
W74-02549 2H

ALEXANDER, L. M.
Indices of National Interest in the Oceans,
W74-02499 6E

ALEXANDER, S. S.
The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

ALI-ZADE, KH. M.
Seasonal Variations in the Qualitative and Quantitative Composition of Young Fish Populations in the Varvara Reservoir, (In Russian),
W74-02560 2H

ALIMDZHANOV, R. A.
Grasshoppers and Crickets in the Karshi Steppe, (In Russian),
W74-02239 3F

ALLEN, T. J.
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

ALT, D. D.
Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

AMATO, R. V.
Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

AMBERG, H. R.
Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

ANDERSON, D. A.
Elevation Dependent Model for Estimating Annual Runoff,
W74-02317 2A

ANDERSON, R. R.
Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

ANGELESCU, N.
Considerations Concerning the Biology and Distribution Area of the Cyprinid Fish Pseudorasbora parva (Schlegel) in the Romanian Waters,
W74-02553 2I

ANJANEYULU, Y.
Extraction and Spectrophotometric Determination of Vanadium as a Mixed Ligand Complex of Oxine and Azide,
W74-02362 5A

ANTIPCHUK, A. F.
The Quantity and Dimensions of Microorganisms in Bottom Sediments of Fish-Breeding Ponds (In Russian),
W74-02228 8I

ARVOLA, W. A.
California High Water, 1970-1971,
W74-02474 2E

ASPITARTE, T. R.
Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

AVNIMELECH, Y.
Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

AXTELL, R. C.
Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

BABOVICH, W. M.
Proper Time Limitations on Outer Continental Shelf Leases Under The National Environmental Policy Act,
W74-02509 6E

BADALOV, S. T.
Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

BAIER, R. E.
Cost Effectiveness in Pollution Control--Treatment of Glue Factory Wastes by Carbon Adsorption System,
W74-02177 5D

Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

Persistent Sea-Foam Masses -- A Problem Solved,
W74-02180 5B

Surface Quality Assessment of Natural Bodies of Water,
W74-02181 5A

Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

BAIERL, I. W.
Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

BAINES, W. D.
The Turbulent Temperature Mixing Layer,
W74-02162 8B

BAKER, D. H. III
Uptake of Mercury by Fish in Natural and Artificial Systems,
W74-02460 5B

BALDWIN, A. D.
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

BALL, R. C.
An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

BANDY, A. R.
Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

BANOUB, M. W.
Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

BANSAL, I. K.
Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

BARBA, D.
Multi-Stage Flash Evaporator,
W74-02490 3A

BARD, A. J.
Hanging Mercury Drop Electrodeposition Technique for Carbon Filament Flameless Atomic Absorption Analysis. Application to the Determination of Copper in Sea Water,
W74-02411 2K

BARIKHIN, S. YA.
Using the Adsorption Method on Activated Charcoal with Chloroform Extraction (CCE) for Evaluating Water Pollution by Organic Substances, (In Russian),
W74-02232 5B

BARKER, J. C.
The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

BARLOW, J. P.
Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

BARNES, J. C.
Use of ERTS Data for Mapping Snow Cover in the Western United States,
W74-02603 7B

BARRATT, R. S.
Analytical Applications of Gas Chromatography of Metal Chelates,
W74-02366 2K

BARTLETT, D.
Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

BATANOUNY, K. H.
Ecological and Phytosociological Study of a Sector in the Lybian Desert,
W74-02507 2I

BAYNE, C. K.
Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

BAZILEVICH, N. I.
Migration of Substances with Surface and Gravitational Waters in Soils of Geochemically Related Landscapes of Baraba, (Migratsiya veshchestv s pverkhnostnymi i gravitatsionnymi vodami v pochvakh geokhimicheski sopryazhennykh landshaftov Baraby),
W74-02300 2G

BEAUMONT, P.
River Regimes in Iran,
W74-02298 2E

BECKEY, H. D.
Potentiality of the Coupling of Column Liquid Chromatography and Field Desorption Mass Spectrometry,
W74-02430 2K

BEDER, B. A.
Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

BEEZHOLD, F. L.
The Use and Effect of Mixed Standards on the Quantitation of Polychlorinated Biphenyls,
W74-02393 5A

BELAND, F. A.
Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

BELCHER, R. S.
A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

BERTRAND, G. L.
Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

BETANCOURT, O. J.
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

BEYCHOCK, M. R.
'Clean Energy Via Coal Gasification',
W74-02462 6B

BHATT, N.
Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

BIANCHI, W. C.
Ground-Water Recharge for Urban Use: Leaky Acres Project,
W74-02468 4B

BICK, H.
Ciliated Protozoa. An Illustrated Guide to the Species Used as Biological Indicators in Freshwater Biology,
W74-02236 2I

BIGGS, R. B.
A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

BILLINGHURST, R. G.
Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

BISWELL, H. H.
Prescribed Fire Effects on Water Repellency, Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4C

BIUNNO, C.
Wetland Fill-Restrictions Do Not Constitute a Compensable 'Taking' Within the Meaning of the Fifth Amendment,
W74-02503 4A

BLAIS, R. N.
Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

BLERSCH, H. C.
Optimum Design Period for Water Pollution Control Plants,
W74-02222 5D

BLOSSER, R. O.
Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

BOCK, R.
Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

BODECHTEL, J.
New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

BOEVSKA, P.
Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

BOGDANOV, N. I.
Microflora and Chemical Composition of the Bottom Deposits of the Kairak-Kum Reservoir, (In Russian),
W74-02253 5B

BOGUSZ, F. J.
System for Monitoring Contaminants in Liquids,
W74-02493 5A

BONDURANT, J. A.
Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

BOON, D. D.
Iron, Zinc, Magnesium, and Copper Concentrations in Body Meat of the Blue Crab, Callinectes sapidus,
W74-02409 5A

BOUGH, W. A.
Characterization of Waste Effluents from a Commercial Pimento Canning Operation,
W74-02379 5A

BOWDEN, K. F.
Dispersion in Flow from a Continuous Source at Sea,
W74-02163 5B

BOWDOIN, W. R.
Easements: Judicial and Legislative Protection of the Public's Rights in Florida's Beaches,
W74-02508 6E

BOWEN, B. E.
High Precision Sampling for Chromatographic Separations,
W74-02414 2K

BOWLEY, C. J.
Use of ERTS Data for Mapping Snow Cover in the Western United States,
W74-02603 7B

BRACKLEY, R. A.
Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

BRANDVOLD, D. K.
Uptake of Mercury by Fish in Natural and Artificial Systems,
W74-02460 5B

BRASIER, R. I.
Another Rio Grande for New Mexico,
W74-02461 3A

BRAUNLICH, G.
Detection of Pollutants in Water by Raman Spectroscopy,
W74-02164 5A

BREBNER, A.
A New Oscillating Water Tunnel,
W74-02160 2J

BRECHT, W.
Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological In-

stitute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

BREWER, R. E.
Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

BRINK, G. E.
Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

BROCKWAY, C. E.
Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

BROWMAN, L. G.
Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

BROWN, D. P.
Hydrogeologic Aspects of a Proposed Sanitary Landfill Near Old Tampa Bay, Florida,
W74-02628 5E

BROWN, E. R.
Frequency of Fish Tumors Found in a Polluted Watershed as Compared to Nonpolluted Canadian Waters,
W74-02401 5C

BROWN, H.
Growth Rates of Lepomis macrochirus (Centrarchidae) in Three Areas of Lake Texoma,
W74-02422 2H

BROWN, H. G.
Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

BROWN, W. M. III
Bolinas Lagoon, Marin County, California, Summary of Sedimentation and Hydrology, 1967-69,
W74-02296 2L

BRUNO, R. O.
An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

BRUTSAERT, W.
A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

BUCKS, D. A.
Trickle Irrigation on Cotton,
W74-02347 3F

BUHLER, D. R.
Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

BUKATA, R. P.
Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

BUNDTSETTEL', M. F.
Lake Sary-Chelek and its Zooplankton, (In Russian),
W74-02261 2H

BURAKHOVICH, M. S.
Effect of a Cinder Settling Tank of a Thermal Electric Power Plant on the Quality of Subsurface Waters, (In Russian),
W74-02231 5B

BURAKOV, D. A.
Probability Analysis in an Approximate Theory of Movement of Water Masses, (Veroyatnostnyy analiz v priblizhennoy teorii peremeshcheniya vodnykh mass),
W74-02305 2E

BURDICK, J. C. III
Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

BURGOS, J. J.
Agroclimatic Areas for Wheat and Bioclimatic Characteristics of its Cultivars in Uruguay, (In Spanish),
W74-02354 3F

BURK, G. A.
Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

BURLEIGH, H. P.
Report by the National Water Commission--A Review,
W74-02463 6B

BURNS, K.
Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

BUSCH, J. R.
Effect of Irrigation, Fertilization, and Other Cultural Practices on Water Quality,
W74-02321 5C

CALKINS, D. J.
Evaluation of Soil Moisture Regime in a Watershed,
W74-02355 2G

CARON, A. L.
Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

CARRELL, L. M.
Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

CARTER, V.
Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

CARTER, W. D.
ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

Hydrogeology of Closed Basins and Deserts of South America, ERTS-1 Interpretations,
W74-02588 7B

CASEY, H.
The Chemical Composition and Flow of the South Winterbourne in Dorset,
W74-02190 2K

CHASE, P. E.
ERTS-1 Investigation of Ecological Effects of Strip Mining in Eastern Ohio,
W74-02572 7B

CHAVEZ, F. III
A Study of Water Used on Urban Landscapes,
W74-02459 6B

CHERKESOV, L. V.
Surface and Internal Waves, (Poverkhnostnyye i vnutrenniye volny),
W74-02299 2E

CHERRY, R. N.
Hydrogeologic Aspects of a Proposed Sanitary Landfill Near Old Tampa Bay, Florida,
W74-02628 5E

CLABORN, V. H.
Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

CLAINOS, D. M.
Input Specifications to Stochastic Decision Models,
W74-02209 2E

CLAUSEN, G. S.
Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

CLEMENS, M. M.
Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

CLYDE, C. G.
Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

COBET, A. B.
Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

COLLINGS, M. R.
The Hydrology of Ten Streams in Western Washington as Related to the Propagation of Several Pacific Salmon Species,
W74-02297 8I

COLLINS, S. H.
Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

COLWICK, A. B.
Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

COOLEY, M. E.
Assessment of Flood Damage in Arizona by Means of ERTS-1 Imagery,
W74-02592 7B

COOPER, R. L.
The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

COPE, J.
Printout Colorimeter for Autoanalysis of Water Pollution,
W74-02374 5A

COPELAND, G. E.
Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

CORNIA, R. L.
Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

CORSI, W. C.
Agroclimatic Areas for Wheat and Bioclimatic Characteristics of its Cultivars in Uruguay, (In Spanish),
W74-02354 3F

COTTER, D. J.
A Study of Water Used on Urban Landscapes,
W74-02459 6B

COUGHENOWER, D. D.
An Automated Analysis for Urea in Seawater,
W74-02421 5A

CRAM, S. P.
High Precision Sampling for Chromatographic Separations,
W74-02414 2K

CRAM, W. J.
The Action of Abscisic Acid on Ion Uptake and Water Flow in Plant Roots,
W74-02260 3F

CRAWFORD, D. L.
Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

CROSBY, G. W.
The Role of Deformation in Changing the Reservoir Properties of Aquifers,
W74-02446 2F

CROSS, C. K.
Analysis of Alkyl Ethoxylates by NMR,
W74-02408 5A

CRYAN, A. P.
A Study of the Factors Determining the Oxygen Uptake of Benthal Stream Deposits,
W74-02451 5C

CUMMANS, J. E.
Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

CURL, H. JR
An Automated Analysis for Urea in Seawater,
W74-02421 5A

DAHM, D. B.
Cost Effectiveness in Pollution Control--Treatment of Glue Factory Wastes by Carbon Adsorption System,
W74-02177 5D

Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

DAIBER, F.
Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

DAMSGAARD, A.
System 21, 'Jupiter' (A Design System for Two-Dimensional Nearly-Horizontal Flows),
W74-02159 7C

DANETSKAYA, E. V.
Some Regularities of Sr90 Accumulation in the Body of a Rat with a High Fluorine Content in Its Drinking Water, (In Russian),
W74-02195 5C

DARMER, K. I.
Flood of June 1972 at Corning, New York,
W74-02479 7C

DAS, B. P.
Bed Scour at End-Dump Channel Constrictions,
W74-02316 8B

DAVAR, K. S.
Evaluation of Soil Moisture Regime in a Watershed,
W74-02355 2G

DAVIDSON, J. M.
Experimental and Predicted Movement of Three Herbicides in a Water-Saturated Soil,
W74-02156 5B

DAVIES, R. A.
Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

DAVIS, P. H.
Experimental Study of the Phase-Selective Anodic Stripping Analysis of Micromolar Cadmium (II) at the Micrometer Hanging Mercury Drop Electrode in 0.1 m Potassium Chloride,
W74-02415 2K

DE SONNEVILLE, J.
Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

DEBOL'SKIY, V. K.
Investigation of Fall Velocity of Sediments in Mountain Streams, (Issledovaniye gidravlicheskoy krupnosti nanosov gornykh rek),
W74-02306 2J

DEGREMONT, A. A.
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Trityimorpholine Association (In French),
W74-02226 5C

DEIN, D.
The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

DEMANCHE, J. M.
An Automated Analysis for Urea in Seawater,
W74-02421 5A

DEVAI, G.
Debrecen Area Inland Waters: Hydrobiological Approach: Influence on Water Quality of Main Eastern Irrigation Canal with Reference to Debrecen's Drinking and Industrial Water Supply,
W74-02543 5C

DEVYATKIN, V. G.
Effect of Heated Water from Konakov Hydro-Electric Station on Oxygen Content and Development of Phytoplankton in Ivan'Kovskoe Reservoir During Winter, (In Russian),
W74-02244 5B

DICKISON, W. T.
Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

DIEKER, J.
Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

DILLON, A.
Comparing the Quality of Our Waters,
W74-02428 5A

DMITRIYEV, A. V.
An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

DOBBS, T. L.
Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

DOLAN, J. W.
Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

DOLGUSHIN, L. D.
Bear Glacier Has Come Alive (Lednik Medvezhiy ozhil),
W74-02614 2C

DONHAM, B. J.
Another Rio Grande for New Mexico,
W74-02461 3A

DOOLEY, J. E.
Analyzing Heavy Ends of Crude,
W74-02378 5A

DRASKOVIC, R.
Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

DRASKOVIC, R. J.
A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

DUBOVSKA, A.
Influence of Herbicides on Microbiological Conditions,
W74-02548 5B

DUGAN, G. L.
Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

DURAND, J. B.
Water Resources Development in the Mullica River Basin,
W74-02450 5C

DYTNERSKII, YU. I.
Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

EASTERBROOK, C. C.
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

EATON, G. P.
ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

EGGER, M.
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Tritylmorpholine Association (In French),
W74-02226 5C

EGNEUS, B.
Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

EID, M. T.
Anhydrous Ammonia for Field Crops: An Evaluation of Anhydrous Ammonia as a Nitrogen Supply for Cotton, Corn, Rice and Wheat,
W74-02240 3F

EISENLOHR, H. H.
Calculation of Dose Conversion Factors for 60Co Gamma Radiation in Water, (In German),
W74-02198 5B

EL-DAMATY, A. H.
Factors Affecting the Manganese Status in Soils of the U.A.R.,
W74-02200 2G

ELEUTERIUS, C. K.
Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

ENGMAN, E. T.
Hurricane Agnes Floods East Mahantango Creek,
W74-02174 2E

ENSOR, P. D. J.
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

EPSTEIN, J.
Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

ERGASHEV, N.
Grasshoppers and Crickets in the Karshi Steppe, (In Russian),
W74-02239 3F

ERGASHEV, S. E.
A Hydrogeothermal Description of Groundwater in Upper Cretaceous Deposits in the Southeast Aral Sea Area (Gidrogeotermicheskaya kharakteristika podzemnykh vod verkhnego mela Yugo-Vostochnogo Priaral'ya),
W74-02609 2F

ERICHSEN, F. P.
Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

ERICKSON, B. J.
Predicting Avalanche Intensity from Weather Data: A Statistical Analysis,
W74-02294 2C

ERICKSON, R. H.
Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

ERIE, L. J.
Trickle Irrigation on Cotton,
W74-02347 3F

ESPEJO, R.
Detection of Major River Bed Changes in the River Ebro (North-Eastern Spain),
W74-02589 7B

EVANS, D. G.
Analysis of Internal Flow Characteristics of a Smooth-Disk Water-Brake Dynamometer,
W74-02475 8C

EVANS, R. L.
A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

EVERETT, G. L.
Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

EXNER, J. H.
Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

EYRING, E. J.
Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

FAIRCHILD, W. D.
Evolving Water Policy and Management in the United States,
W74-02358 6B

FAIRHALL, A. W.
Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

FAIRLESS, C.
Hanging Mercury Drop Electrodeposition Technique for Carbon Filament Flameless Atomic Absorption Analysis. Application to the Determination of Copper in Sea Water,
W74-02411 2K

FALCONER, A.
Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

FANGMEIER, D. D.
A Way to Make the Desert Green,
W74-02346 3B

FARRINGTON, J. W.
Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

FARWELL, S. O.
Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

FAST, A. W.
A New Aquatic Insect Trap,
W74-02551 7B

FATTAH, Q. N.
Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

FAZZOLARE, R. A.
The Use of Power Plant Heat in a Physical-Chemical Domestic Wastewater Renovation System,
W74-02208 5D

FERGUSON, D. E.
Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Houston, Texas Metropolitan Area, 1971,
W74-02471 2E

FLECK, W. B.
Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

FLOOD, R. E. JR
Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

FONES, R. V.
A Pneumatic Sample Changer for Gamma-Ray Spectroscopy,
W74-02407 7B

FORDHAM, H. W.
Soil Pollution from Cattle Feedlots in Georgia,
W74-02210 5B

FRANO, A.
Influence of the Soil Water Level on Microbial Processes of Pasture and Forest Communities,
W74-02194 2G

FRANTZ, VON A.
A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

FRENCH, O. F.
Trickle Irrigation on Cotton,
W74-02347 3F

FRIDMAN, SH. D.
An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

FRIEL, E. A.
Floods at Martinsburg and Vicinity, West Virginia,
W74-02615 2E

GABLINGER, M.
Use of Systems Approaches in Planning Israel's Water Resources Management,
W74-02352 6A

GAITHER, W. S.
Research in the Coastal and Oceanic Environment,
W74-02481 2L

GALVIN, C. J. JR
Wave Breaking in Shallow Water,
W74-02638 2L

GAMER, G.
Detection of Pollutants in Water by Raman Spectroscopy,
W74-02164 5A

GANYUSHINA, E. V.
Effect of Excess Soil Moisture on Yield and Biochemical Processes in Spring Wheat at Various Stages of Its Development (In Russian),
W74-02325 3F

GARANIN, V. I.
The Age Group Distribution of Pelobates fuscus (Laur.) at the Kuibyshev Reservoir Shores (In Russian),
W74-02641 2H

GAROFALO, D.
Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

GAUNTLETT, R. B.
The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

GBUREK, W. J.
Hurricane Agnes Floods East Mahantango Creek,
W74-02174 2E

GILBERTSON, B.
Monitoring Vegetation Cover on Mine Dumps with ERTS-1 Imagery: Some Initial Results,
W74-02574 7B

GILMER, D. S.
Preliminary Evaluation of ERTS-1 for Determining Numbers and Distribution of Prairie Ponds and Lakes,
W74-02597 7B

GINZBURG, M. R.
Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

GIURCA, R.
Considerations Concerning the Biology and Distribution Area of the Cyprinid Fish Pseudorasbora parva (Schlegel) in the Romanian Waters,
W74-02553 2I

GLOBUS, A. M.
Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

GLUSHCHENKO, V. M.
Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

GODDARD, J. E.
Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

GODLEWSHA-LIPOWA, W. A.
The Effect of Organic Substrates on the Abundance of Bacteria in the Water of 5 Masurian Lakes,
W74-02556 5C

GODLEWSKA-LIPOWA, W. A.
The Effect of Temperature on the Generation Time of a Bacterial Community in Lake Water,
W74-02557 5B

GOLD, D. P.
The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

GOLDSTEIN, H. M.
An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

GONZALEZ, J. G.
The Determination of Methyl Mercury in Urine,
W74-02387 5A

GOODMAN, B. L.
Method for Removing Suspended Solids from Liquids,
W74-02484 5D

GORDEEV, N. A.
The Prospects of Using the Rybinsk Water Storage Basin for Fisheries, (In Russian),
W74-02241 8I

GORDON, E. C.
Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

GORDON, E. D.
Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

GRACANIN, M.
On the Concept and Determination of Critical Soil Moisture,
W74-02546 2G

GRAHAM, D. J.
Floating Water Jet for Oil Slick Control,
W74-02494 5G

GRANSTROM, L.
Water Resources Development in the Mullica River Basin,
W74-02450 5C

GRANT, M. J.
Approaches to State Coastal Management,
W74-02185 2L

GREEN, T.
Long Waves in Shallow Triangular Channels,
W74-02158 2E

GREENSPAN, I.
Frequency of Fish Tumors Found in a Polluted Watershed as Compared to Nonpolluted Canadian Waters,
W74-02401 5C

GREER, R. D.
Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

GREGORY, W. S.
Another Rio Grande for New Mexico,
W74-02461 3A

GRUNWELL, J. R.
Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

GUARD, H. E.
Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

GUENZI, W. D.
Picloram Photolytic Decomposition,
W74-02383 5B

HAAN, C. T.
Calibrating A Water Yield Model for Small Ungaged Watersheds,
W74-02172 2A

HAHNE, H. C. H.
Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

HALCROW, W.
The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

HALE, G. M.
Optical Constants of Water in the 200-nm to 200-Micrometer Wavelength Region,
W74-02167 2K

HALKER, B. B.
Method and Apparatus for Electrolytic Treatment of Sewage,
W74-02486 5D

HALL, R. C.
Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

HALLBERG, G. R.
Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

HALLERMEIER, R. J.
Design Considerations for a 3-D Laser Doppler Velocimeter for Studying Gravity Waves in Shallow Water,
W74-02642 2L

HAMDI, H.
Factors Affecting the Manganese Status in Soils of the U.A.R.,
W74-02200 2G

HAMILTON, R. A.
Agricultural Chemicals in Surface Runoff, Ground Water, and Soil: 1. Endrin,
W74-02152 5B

HAMMER, R. M.
Application and Consequences of Precipitation Observations in the Republic of Sudan in View of the Nomadic Life and Economy,
W74-02348 2B

HAMPTON, B. B.
Annual Compilation and Analysis of Hydrologic Data for Green Creek, Brazos River Basin, Texas, 1971,
W74-02626 4D

Annual Compilation and Analysis of Hydrologic Data for Little Elm Creek, Trinity River Basin, Texas, 1971,
W74-02477 2E

HANN, R. W. JR
Hymo: Problem-Oriented Computer Language for Hydrologic Modeling--Users Manual,
W74-02469 2A

HARGROVE, J. L.
New Concepts in the Law of the Sea,
W74-02497 6E

HARKIN, J. M.
Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

HART, F. L.
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

HARTNETT, M. A.
A Study of the Factors Determining the Oxygen Uptake of Benthal Stream Deposits,
W74-02451 5C

HASEGAWA, K.
On the Variation of Salinity Distribution in a Reservoir, Situated in Reclaimed Land, (Japanese),
W74-02246 2H

HATANO, H.
A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

HAUSLEROVA, J.
Occurrence of Saprochaete saccharophyla Coker Et Shanor in Fungoid Growth below the Discharge of Breweries, (In Czech),
W74-02242 5B

HAW, F.
Puget Sound Resident Coho Salmon Study,
W74-02639 2L

HAWLEY, K. T.
Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

HAZDRA, J. J.
Frequency of Fish Tumors Found in a Polluted Watershed as Compared to Nonpolluted Canadian Waters,
W74-02401 5C

HEALD, E. J.
Applicability of the Interceptor Waterway Concept to the Rookery Bay Sanctuary,
W74-02205 4A

HELBER, H. H.
Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

HELFGOTT, T.
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

HELLING, C. S.
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

HENDERSON, M.
Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

HENSON, E. B.
Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

HEYWOOD, R. B.
Antarctic Limnology: A Review,
W74-02552 2C

HILL, G. W.
The Hydrology of Ten Streams in Western Washington as Related to the Propagation of Several Pacific Salmon Species,
W74-02297 8I

HILTON, G. M.
Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

HIMSLEY, A.
Sodium Recovery from a Pulp Mill Waste Effluent by Ion Exchange,
W74-02259 5D

HIROSE, H.
On Mallomonas lelymeme Harris Et Bradley (Chrysophyceae), (In Japanese),
W74-02550 2H

HIRSCH, D. E.
Analyzing Heavy Ends of Crude,
W74-02378 5A

HLADKA, A.
Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

HOBBS, J. J.
Comparing the Quality of Our Waters,
W74-02428 5A

HODGES, C. N.
The Use of Desalted Seawater for Intensive Agricultural Applications, (El Uso de Agua de Mar Desalada Para Intensivas Aplicaciones Agricolas),
W74-02359 3A

HOGLUND, B.
Studies of the Sinking Plume Phenomenon,
W74-02644 5C

HOLLAND, W. J.
Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

HOLLEY, E. R.
Field Tests on Transverse Mixing in Rivers,
W74-02318 5B

HOLT, D. R.
Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

HOOPES, J. A.
Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

HOPPINS, R. A.
Structural Interpretations Based on ERTS-1 Imagery, Bighorn Region, Wyoming-Montana,
W74-02568 7B

HOSENFELD, E.
Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

HOWARD, T. E.
Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

HOYER, B. E.
Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

HUGHES, D. R.
A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

HUGHES, P. J.
Slope Aspect and Tunnel Erosion in the Loess of Banks Peninsula, New Zealand,
W74-02288 2J

HUGHES, R. A.
Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

HUGHES, T. C.
Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

HUNTER, J. V.
A Study of the Factors Determining the Oxygen Uptake of Benthal Stream Deposits,
W74-02451 5C

IKRAMUDDIN, M.
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

IL'ENKO, A. I.
Some Characteristics of Cesium-137 Accumulation in Populations of Freshwater Fish, (In Russian),
W74-02196 5C

ILICHKINA, A. G.
Effect of A Cement Anticorrosion Coating on the Quality of Drinking Water, (In Russian),
W74-02233 5B

IL'INA, L. K.
The Prospects of Using the Rybinsk Water Storage Basin for Fisheries, (In Russian),
W74-02241 8I

ILYUSHINA, M. T.
Phytoindication of Saline Ground in Drying Up Shallow Lakes, (In Russian),
W74-02559 2H

INCE, S.
The Importance of Sediment Transport in Water Resources Planning,
W74-02351 4D

IPITMAN, M. G.
The Action of Abscisic Acid on Ion Uptake and Water Flow in Plant Roots,
W74-02260 3F

ISENSEE, A. R.
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

ISIRIMAH, N. A.
Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

ISSA, Y. M.
Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

IVEY, M. C.
Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

JACKWERTH, E.
Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

JACOBS, H. J.
Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

JAMES, G. W.
Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

JANECZEK, W. A.
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

JARBOE, J. E.
Calibrating A Water Yield Model for Small Ungaged Watersheds,
W74-02172 2A

JEFFERIES, D. F.
Distribution of Caesium-137 in British Coastal Waters,
W74-02365 5B

JEZESKI, J. J.
Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

JOHNSON, B. D.
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

JOHNSON, C. W.
A New Fault Lineament in Southern California,
W74-02570 7B

JOHNSON, J. S. JR
Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

JOHNSON, K. L.
An Enclosed Weir for Small Streams in Snow Country,
W74-02249 7B

JOHNSON, M.
Occurrence of Silica in the Natural Waters of the Huntley-Robertson District, Southern New South Wales,
W74-02555 2K

JOHNSON, T. A.
Weather Modification Operations In California, October 1, 1970-September 30, 1971,
W74-02293 3B

JOHNSON, W. D.
Occurrence of Silica in the Natural Waters of the Huntley-Robertson District, Southern New South Wales,
W74-02555 2K

JOLLEY, R. L.
Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

JONAS, R. S.
Urban Storm Drainage Activities in New York,
W74-02171 4A

JONES, G. E.
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

JONES, T. R.
Effluent Treatment at Man-Made Fibre Production Units,
W74-02263 5D

JORDAN, R. R.
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

JORGENSEN, D. G.
Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

JOYCE, J. R.
An Improved Bottom-Water Sampler,
W74-02410 7B

JOYNER, B. F.
Nitrogen, Phosphorus, and Trace Elements in Florida Surface Waters, 1970-71,
W74-02476 5A

JUDKINS, J. F. JR
Water-Treatment-Sludge Filtration Studies,
W74-02440 5D

JUDSON, A.
Predicting Avalanche Intensity from Weather Data: A Statistical Analysis,
W74-02294 2C

JUNE, F. C.
Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

JURS, P. C.
Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

KADOTA, M.
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

KAEMPF, H. J.
Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

KAITO, H.
Some Limnological Remarks on Lake Saizuchi-Numa, Yamagata Prefecture, (In Japanese),
W74-02207 5C

KALBE, L.
Comparative Productivity Studies of Three Mecklenburg Lakes (Lake Kummerow, Lake Teterow and Lake Malchin), (In German),
W74-02558 2H

KAMIKO, T.
Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

KAMPHUIS, J. W.
A Shear Plate for Use in Oscillatory Flow,
W74-02161 2E

KARADI, G. M.
Unsteady Drawdown at a Partially Penetrating Well in a Transversely Isotropic Artesian Aquifer,
W74-02466 4B

KARASEK, F. W.
Sampling Techniques in Chromatography,
W74-02372 7B

KARDASH, F. G.
Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

KARSTEN, D.
Economic Aspects of Environmental Protection (In German),
W74-02227 5G

KATZER, T. L.
Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

KEENEY, D. R.
Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

KEITH, L.
Frequency of Fish Tumors Found in a Polluted Watershed as Compared to Nonpolluted Canadian Waters,
W74-02401 5C

KELLER, E. C. III
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

KELLER, E. C. JR
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

KENSLER, C. J.
Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

KERN, P. C. E.
Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

KEVERN, N. R.
An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

KHALIFA, H.
Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

KHALILOV, A. R.
Contribution to the Study of Zooplankton and Zoobenthos in the Mingechaur Reservoir, (In Russian),
W74-02341 2H

KHAN, M. Y.
Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

KHENITZ, G.
The Balance of Surface Water Resources in the Lower Mesopotamian Valley,
W74-02350 6B

KINDLE, E. C.
Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

KIPTENKO, YE. N.
Storm Rainfall in the Carpathians in June 1969,
W74-02606 2B

KIRKHAM, D.
Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

KLEMAS, V.
Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

KLETT, A. T.
Preliminary Evaluation of ERTS-1 for Determining Numbers and Distribution of Prairie Ponds and Lakes,
W74-02597 7B

KLINGEMAN, P. C.
Hydrologic Evaluations in Bridge Pier Scour Design,
W74-02309 8B

KNAUSS, J. A.
Development of the Freedom of Scientific Research Issue of the Third Law of the Sea Conference,
W74-02501 6E

KNICKMEYER, W. W.
Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

KNIGHT, K. L.
Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

KNIZHNIKOV, V. A.
Some Regularities of Sr90 Accumulation in the Body of a Rat with a High Fluorine Content in Its Drinking Water, (In Russian),
W74-02195 5C

KOCH, W.
Anionic Exchange Separations of the Elements that can be Extracted with Tributyl Phosphate. II, (Anionenaustauschtrennungen der mit Tributylphosphat extrahierbaren Elemente. II),
W74-02432 2K

Determination of Small Amounts of Uranium After Concentrating Through Extraction and Anionic Exchange in a Solvent Agent System Containing Tri-N-Octylphosphine Oxide. (Bestimmung geringer Uranmengen nach Konzentrierun g durch Extraktion und Anionenaustausch in einem tri-n-octylphoshinoxidhaltigen Losungsmittelsystem),
W74-02434 5A

KOCHAROV, R. G.
Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

KOGAN, L. D.
Investigation of Fall Velocity of Sediments in Mountain Streams, (Issledovaniye gidravlicheskoy krupnosti nanosov gornykh rek),
W74-02306 2J

KOGAN, R. M.
An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

KOHLER, M. L.
Sedimentation and Scour Off Nuclear Power Plants,
W74-02645 2J

KOLESNIKOV, A. S.
Effect of a Cinder Settling Tank of a Thermal Electric Power Plant on the Quality of Subsurface Waters, (In Russian),
W74-02231 5B

KOLOMYTS, E. G.
Experience in a Quantitative Assessment of Organization of Snow Cover as a Natural System (Opyt kolichestvennoy otsenki organizatsii snezhnogo pokrova kak prirodnoy sistemy),
W74-02613 2C

KONOVALOVA, N. I.
Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

KONSTANTINOV, V. D.
Moisture Regime of Southern Chernozem Within Shelterbelts, (Rezhim vlazhnosti yuzhnogo chernozema v sisteme lesnykh polos),
W74-02302 2G

KORENYUK, L. V.
Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

KORKISCH, J.
Anionic Exchange Separations of the Elements that can be Extracted with Tributyl Phosphate. II, (Anionenaustauschtrennungen der mit Tributylphosphat extrahierbaren Elemente. II),
W74-02432 2K

Determination of Small Amounts of Uranium After Concentrating Through Extraction and Anionic Exchange in a Solvent Agent System Containing Tri-N-Octylphosphine Oxide. (Bestimmung geringer Uranmengen nach Konzentrierun g durch Extraktion und Anionenaustausch in einem tri-n-octylphoshinoxidhaltigen Losungsmittelsystem),
W74-02434 5A

KOTHANDARAMAN, V.
Water Quality Characteristics of Storm Sewer Discharges and Combined Sewer Overflows,
W74-02345 5B

KOVAC, J.
Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

KRAGTEN, J.
Selection of Experimental Conditions for the Photometric Complex Formation Titrations of Metals in the PPM-Range,
W74-02404 5A

KRIZEK, R. J.
Unsteady Drawdown at a Partially Penetrating Well in a Transversely Isotropic Artesian Aquifer,
W74-02466 4B

KROONTJE, W.
Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

KUBLER, B.
Salt, a Little-Known Aggressor in Our Environment, (In French),
W74-02199 5B

KUDRYAVTSEV, V. M.
The Ability of Bacteria to Mineralize Algae Organic Matter, (In Russian),
W74-02252 5B

KUMAR, A.
The Phenology of Dragonflies in the Dehra Dun Valley, India,
W74-02237 2I

KURACHEV, V. M.
Migration of Substances with Surface and Gravitational Waters in Soils of Geochemically Related Landscapes of Baraba, (Migratsiya veshchestv s pverkhnostnymi i gravitatsionnymi vodami v pochvakh geokhimicheski sopryazhennykh landshaftov Baraby),
W74-02300 2G

KURDINA, T. N.
Effect of Heated Water from Konakov Hydro-Electric Station on Oxygen Content and Development of Phytoplankton in Ivan'Kovskoe Reservoir During Winter, (In Russian),
W74-02244 5B

KURZ, D.
Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

KUZIN, P. S.
Water-Balance Method and Its Practical Importance, (Metod vodnogo balansa i yego prakticheskoye znacheniye),
W74-02308 2A

KWANT, G. W.
Sixteen Years of Water Fluoridation in the Netherlands and Its Influence on Dental Decay,
W74-02229 5F

KWAPINSKI, J. B. G.
Frequency of Fish Tumors Found in a Polluted Watershed as Compared to Nonpolluted Canadian Waters,
W74-02401 5C

KWIATEK, R.
Cleanliness of Wells, Chemical Substances in Drinking Water and Their Relation to Caries (In Polish),
W74-02544 5C

KYRIACOU, D.
Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

LAFORNARA, J. P.
In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

LAMMERER, B.
New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

LANCE, R.
Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

LANCE, R. J.
Heavy Metals in the Main Streams of the James River Basin, Missouri,
W74-02445 5A

LAND, J. E.
Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

LARSON, F. C.
Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

LAU, L. S.
Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

LAZARCHIK, V. M.
Effect of Excess Soil Moisture on Yield and Biochemical Processes in Spring Wheat at Various Stages of Its Development (In Russian),
W74-02325 3F

LEAF, C. F.
Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

LECOMPTE, A. R.
Advanced Practical Water Recycle in Tissue Manufacture,
W74-02279 5D

LEE, G. F.
Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

LEINWEBER, C. L.
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

LEIS, W. M.
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

LEITNER, J. E.
High Precision Sampling for Chromatographic Separations,
W74-02414 2K

LEONARD, R. P.
Cost Effectiveness in Pollution Control--Treatment of Glue Factory Wastes by Carbon Adsorption System,
W74-02177 5D

LEWIS, R. E.
Dispersion in Flow from a Continuous Source at Sea,
W74-02163 5B

LIDDELL, R. W. III
Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

LIEBIG, W.
Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

LIND, A. O.
Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

LINDEBORG, K. H.
Evaluation of the Regional Multipurpose Economic Benefits Resulting From a Water and Related Land Resource Development,
W74-02439 6B

LINDPERE, A.
Use of Sephadex Gel for the Fractionation of Organic Matter in Lake Water, (In Russian),
W74-02343 5A

LINGG, A. J.
The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

LITOVSKA, G.
Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

LITOVSKI, Z.
Use of Fibrous Materials for Removal of Iron and Iron Compounds From Thermoelectric Power Plant Water and Condensates, (Izpolzuvane na vlaknest material za ulavyane na zhelezo i zhelezni suedineniya ot vodite i kondenzatite na tets),
W74-02251 5D

LIU, P. L-F.
Damping of Water Waves Over Porous Bed,
W74-02315 2E

LIUZZO, G.
Multi-Stage Flash Evaporator,
W74-02490 3A

LOH, P.
Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

LOHMAR, J.
Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

LOOSEMORE, W. R.
Ultrasonic River Flow Measurement,
W74-02250 2E

LUECK, B. F.
Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

LUETTIG, G.
Groundwater Exploration and Provision from the Hydrogeological Point of View,
W74-02353 4B

LYONS, W. A.
ERTS-1 Views the Great Lakes,
W74-02602 7B

LYUTIK, P. M.
Storm Rainfall in the Carpathians in June 1969,
W74-02606 2B

MACCLANAHAN, J.
Flood Control Project Maintenance and Repair--1970 Inspection Report,
W74-02617 2E

MACKAY, A. C.
Analysis of Alkyl Ethoxylates by NMR,
W74-02408 5A

MACKAY, D. W.
The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

MACKAY, G. D. M.
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

MACLEOD, N. H.
Digital Analysis of Potomac River Basin ERTS Imagery: Sedimentation Levels at the Potomac-Anacostia Confluence and Strip Mining in Allegheny County, Maryland,
W74-02583 7B

MACURA, A.
Cleanliness of Wells, Chemical Substances in Drinking Water and Their Relation to Caries (In Polish),
W74-02544 5C

MADHAV, M. R.
Studies on Seepage from Canals with Partial Lining,
W74-02319 4A

MAGNUSON, L. M.
Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

MAGOON, O. T.
Use of ERTS-1 in Coastal Studies,
W74-02633 2L

MAIRS, R. L.
Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

MAKAROV, G. V.
Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

MARINI, R. C.
Cost Effectiveness of Current Environmental Engineering Practices,
W74-02225 5D

MARKOVIC, V.
Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

MARTFELD, D. E.
California High Water, 1970-1971,
W74-02474 2E

MARTINOLA, F.
Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

MARUTA, T.
Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

MARUYASU, T.
A Study on the Erosion of Niigata Beach from ERTS-A Imagery,
W74-02584 7B

MARZOLF, G. R.
Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

MASSONI, C. J.
A Pneumatic Sample Changer for Gamma-Ray Spectroscopy,
W74-02407 7B

MATLOCK, W. G.
Use of Digital Computer Techniques in Water Resources Data Storage,
W74-02357 4B

A Way to Make the Desert Green,
W74-02346 3B

MAURIELLO, L. J.
Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

MAXWELL, P. A.
The Ex Post Measurement of Benefits and Costs in Small Watershed Projects,
W74-02212 6B

MAYER, C.
Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

MAYHAN, K. G.
Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

MAYO, S. A.
Printout Colorimeter for Autoanalysis of Water Pollution,
W74-02374 5A

MCCABE, J. S.
Underwater Tanker Ballast Water/Oil Separation,
W74-02492 5G

MCCARLEY, H.
Growth Rates of Lepomis macrochirus (Centrarchidae) in Three Areas of Lake Texoma,
W74-02422 2H

MCCAULEY, J. R.
Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

MCCLIMANS, R. J.
Urban Storm Drainage Activities in New York,
W74-02171 4A

MCCLYMONDS, N. E.
Shallow Ground Water in the Zamin Dawar Area, Helmand Province, Afghanistan,
W74-02472 4B

MCCOY, J.
Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

MCDONALD, D. B.
Some Chemical and Biological Characteristics of the Mississippi River Bordering Iowa,
W74-02363 5B

MCDOUGAL, J. R.
Experimental and Predicted Movement of Three Herbicides in a Water-Saturated Soil,
W74-02156 5B

MCGILL, H. N.
Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

MCGINNESS, J.
Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

MCKENNA, Q. H.
Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

MCKIBBEN, J. W.
Method for Removing Suspended Solids from Liquids,
W74-02484 5D

MCLEAN, A. Y.
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

MEDINA, G.
Comparing the Quality of Our Waters,
W74-02428 5A

MEIER, M. F.
Evaluation of ERTS Imagery for Mapping and Detection of Changes of Snowcover on Land and on Glaciers,
W74-02604 7B

MELHORN, W. N.
Recognition of Surface Lithologic and Topographic Patterns in Southwest Colorado with ADP Techniques,
W74-02562 7B

MELNICK, J. L.
Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

MENGEL, K.
The Effect of Soil Moisture Upon the Availability of Potassium and its Influence on the Growth of Young Maize Plants (Zea mays L.),
W74-02554 3F

MESTROV, M.
Limnological Characteristics of Jezero on the Island of Krk, (In Serbo-Croatian),
W74-02386 2H

MEYER, W. R.
Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

MICHAEL, N. K.
Floodplain Mapping and Planning for the 50 and 100 Year Interval Flood Zones of the Bitterroot Valley, Montana,
W74-02215 4A

MICHEL, H. O.
Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

MILLER, J. C.
A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

MILNE, R. A.
Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

MINAEV, V. A.
Purification of Effluents by Means of Reverse Osmosis, (Ochistka stochnykh vod metodom obratnogo osmosa),
W74-02258 5D

MINTURN, R. E.
Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

MIROSHNICHENKO, L. S.
Dry Activated Sludge as Fertilizer for Winter Wheat and Corn, (Sukhoi aktivnyi il kak udobrenie dlya posevov ozimi pshenits' i kukuruz'),
W74-02270 5D

MIROTVORSKAYA, N. K.
Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

MISHRA, G. C.
Studies on Seepage from Canals with Partial Lining,
W74-02319 4A

MOAYERI, M. S.
Flow in Open Channels With Smooth Curved Boundaries,
W74-02312 8B

MOCHIDA, E.
A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

MOLENAAR, D.
Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

MONCRIEF, L. W.
The Demand for and Value of the Sport Fishery on the Au Sable, Jordan, and Red Cedar Rivers,
W74-02204 6B

Economic Evaluation of the Sport Fishery of the Au Sable River, Michigan,
W74-02203 6B

User Related Study of Three Michigan Rivers,
W74-02202 6B

MONKMEYER, P. L.
Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

MOORE, G. E.
Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

MOORE, J. R.
Sedimentation and Scour Off Nuclear Power Plants,
W74-02645 2J

MOORHEAD, E. D.
Experimental Study of the Phase-Selective Anodic Stripping Analysis of Micromolar Cadmium (II) at the Micrometer Hanging Mercury Drop Electrode in 0.1 m Potassium Chloride,
W74-02415 2K

MOREAU, J.
Comparative Biology of Tilapia rendalli (Boulenger) (Pisces cichlidae) in Lake Itasy and Lake Mantasoa, (In French),
W74-02344 2H

MORIN, G. C. A.
A Way to Make the Desert Green,
W74-02346 3B

MORLEY, C. G.
Legal Developments in Canadian Water Management,
W74-02505 6E

MORRIS, D. C.
Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

MORRISON, R. B.
Assessment of Flood Damage in Arizona by Means of ERTS-1 Imagery,
W74-02592 7B

MORTON, S. A.
Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

MOSIER, A. R.
Picloram Photolytic Decomposition,
W74-02383 5B

MOUNTCASTLE, W. R.
Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

MUCKLESTON, K. W.
The Problems and Issues of Implementing the Federal Water Project Recreation Act in the Pacific Northwest,
W74-02453 6C

MUIR, J.
A Study of Factors Influencing the Nitrogen and Phosphorus Contents of Nebraska Waters,
W74-02151 5B

MURRAY, D. L.
Comparison of Raingauge Evaporation Suppressants,
W74-02289 2D

NAIDU, P. P.
Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

NAKAMURA, R.
Accumulation of Strontium and Calcium in Freshwater Fishes of Japan,
W74-02197 5C

NAKAUE, H. S.
Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

NAYLOR, D. V.
Effect of Irrigation, Fertilization, and Other Cultural Practices on Water Quality,
W74-02321 5C

NEALE, R. J.
The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

NELSON, W. R.
Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

NERPIN, S. V.
Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

NEUMAN, S. P.
Saturated-Unsaturated Seepage by Finite Elements,
W74-02313 2G

NEWTON, P. V. R.
The Chemical Composition and Flow of the South Winterbourne in Dorset,
W74-02190 2K

NIGHTINGALE, H. I.
Ground-Water Recharge for Urban Use: Leaky Acres Project,
W74-02468 4B

NIXON, S. J.
Groundwater Pollution in the Western States--Private Remedies and Federal and State Legislation,
W74-02506 5G

NORINA, A. E.
Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

NOTENBOOM, H. R.
Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

NOVOTNY, D.
Determination of the Mechanical Compatibility of Porous Rocks with Waste Water in its Subsurface Disposal,
W74-02165 5B

NYQUIST, D.
Effects of Highway Bridge Construction on a Subarctic Stream,
W74-02295 4C

O'BRIEN, E. J.
A Modified Extraction Method for Determination of Mineral Oil in Sea Water,
W74-02388 5A

OCHIAI, H.
Red Tide in Ise Bay,
W74-02587 7B

O'CONNELL, P. E.
A Bayesian Decision Framework for Synthetic Hydrology,
W74-02438 6A

OEHLER, D. D.
Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

OEHME, C.
Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

OFFNER, F. F.
Computer Simulation of Storm Water Runoff,
W74-02310 2E

OHNO, S.
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

OKUBO, K.
Process for Removal of Contaminants from Wastes,
W74-02487 5D

OLOVYANNIKOVA, I. N.
Water Regime of Solonchak Solonetzes in Open Areas of Forests in the North Caspian Sea Region, (Vodnyy rezhim solonchakovykh solontsov na polyanakh lesnykh nasazhdeniy Severnogo Prikaspiya),
W74-02301 2G

OLSON, C. E.
Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

OLSON, R. A.
A Study of Factors Influencing the Nitrogen and Phosphorus Contents of Nebraska Waters,
W74-02151 5B

ORABI, A. A.
Factors Affecting the Manganese Status in Soils of the U.A.R.,
W74-02200 2G

O'ROURKE, J. F.
Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

OSDOR, A.
Internally Interconnected Multi-Stage Distillation System,
W74-02496 3A

OSTROVSKAYA, T. I.
Effect of a Cinder Settling Tank of a Thermal Electric Power Plant on the Quality of Subsurface Waters, (In Russian),
W74-02231 5B

OTHMER, D. F.
Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

OTLEY, M. J.
A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

OWENS, D. E.
Sewage Treatment Apparatus,
W74-02489 5D

OWENS, E. L.
Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

PACKHAM, R. F.
The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

PAHL, R. H.
Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

PALAMAR-MORDVYNTSEVA, H. M.
Effect of Supernatant Fluid of the Ankistro-Desmus braunii Brunnth Culture on Development of Algae in Waste Waters of the Chernigov Chemical Fiber Industrial Group, (In Ukrainian),
W74-02245 5C

PANTONY, D. A.
Analysis by Means of Gas Bubble Electrification,
W74-02406 2K

PAQUETTE, A. J.
'Clean Energy Via Coal Gasification',
W74-02462 6B

PARDEE, R. L.
Water Pollution Control,
W74-02495 5G

PARMELE, L. H.
Hurricane Agnes Floods East Mahantango Creek,
W74-02174 2E

PARSONS, D. K.
A Way to Make the Desert Green,
W74-02346 3B

PASTERNAK, K.
The Spreading of Heavy Metals in Flowing Waters in the Region of Occurrence of Natural Deposits and of the Zinc and Lead Industry. (Rozprzestrzenienie metali ciezkich w wodach plynacych w rejonie wystepowania naturalnych zloz oraz przemyslu cynku i olowiu),
W74-02435 5B

PAULSON, R. W.
Preliminary Analysis of ERTS-Relayed Water-Resources Data in the Delaware River Basin,
W74-02595 7B

PAVLOS, P. G.
Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

PEARCE, J. W.
The Demand for and Value of the Sport Fishery on the Au Sable, Jordan, and Red Cedar Rivers,
W74-02204 6B

Economic Evaluation of the Sport Fishery of the Au Sable River, Michigan,
W74-02203 6B

PEARSON, K. H.
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

PEASE, R. W.
A New Fault Lineament in Southern California,
W74-02570 7B

PEASE, S. R.
ERTS-1 Views the Great Lakes,
W74-02602 7B

PELTON, J.
Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

PENA, C.
The Use of Desalted Seawater for Intensive Agricultural Applications, (El Uso de Agua de Mar Desalada Para Intensivas Aplicaciones Agricolas),
W74-02359 3A

PENTON, J. W.
Oil Skimming Apparatus,
W74-02491 5G

PERLA, R. I.
Hyperbolic Stress Equations for Compressible Slabs,
W74-02624 2C

PERRET, P.
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Tritylmorpholine Association (In French),
W74-02226 5C

PERRY, H. M.
Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

PETERS, H. T.
Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

PETERSON, B. J.
Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

PETERSON, L. A.
Effects of Highway Bridge Construction on a Subarctic Stream,
W74-02295 4C

PETRIK, M.
Limnological Characteristics of Jezero on the Island of Krk, (In Serbo-Croatian),
W74-02386 2H

PETROVIC, G.
A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

PETTY, M. S.
Detection of Pollutants in Water by Raman Spectroscopy,
W74-02164 5A

PETTYJOHN, W.
ERTS-1 Investigation of Ecological Effects of Strip Mining in Eastern Ohio,
W74-02572 7B

PETTYJOHN, W. A.
Flow Analysis of Hydraulic Connectors in Artificial Recharge Systems, A Model Study,
W74-02219 4B

PFEIFFER, G. H.
Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

PHILIP, J. R.
On Solving the Unsaturated Flow Equation: The Flux-Concentration Relation,
W74-02464 2G

PICKFORD, C. J.
Analysis of High-Purity Water by Flameless Atomic-Absorption Spectroscopy. Part II. Signal Integration with a Non-Resonance Line Correction System for Spurious Absorption Phenomena,
W74-02385 5A

PICKLE, H. B.
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

PIECH, K. R.
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

PIJANOWSKI, B. S.
Salinity Corrections for Dissolved Oxygen Measurements,
W74-02424 5A

PISKIN, R.
Evaluation of Nitrate Content of Ground Water in Hall County, Nebraska,
W74-02465 5B

PITTMAN, U. J.
Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

PLANT, R.
Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

PLUHOWSKI, E. J.
Remote Sensing of Turbidity Plumes in Lake Ontario,
W74-02601 7B

POCHOP, L. O.
Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

POLCYN, F. C.
Progress of an ERTS-1 Program for Lake Ontario and its Basin,
W74-02600 7B

PONDER, F. JR
The Effects of Trace Metals on Ground Water Quality as Influenced by Soils Reflecting Differences in Organic Matter Content and Genetic Conditions,
W74-02211 5B

PONTECORVO, G.
Ocean Science and Mutual Assistance: An Uneasy Alliance,
W74-02500 6E

POPOV, V. I.
Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

POPP, C. J.
Uptake of Mercury by Fish in Natural and Artificial Systems,
W74-02460 5B

PORTER, J. J.
Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

POWERS, J. B.
Weather Modification Operations In California, October 1, 1970-September 30, 1971,
W74-02293 3B

PRESCOTT, J. R.
Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

PRESTON, A.
Distribution of Caesium-137 in British Coastal Waters,
W74-02365 5B

PREUNER VON PRITTWITZ, J.
Hygienic Conditions in the Procurement of Drinking Water from Individual Sources (In German),
W74-02547 5B

PROCTOR, P. D.
Heavy Metals in the Main Streams of the James River Basin, Missouri,
W74-02445 5A

PROTZ, R.
Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

PUSHKAR, P.
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

QUERRY, M. R.
Optical Constants of Water in the 200-nm to 200-Micrometer Wavelength Region,
W74-02167 2K

QUINN, J. G.
Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

RADOSAVLJEVIC, R.
A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

RADOSEVICH, G. E.
Legal and Institutional Constraints in Consolidating Irrigation Systems,
W74-02533 3F

RAFFELSON, C. N.
Evaporation from Snowdrifts Under Oasis Conditions,
W74-02183 2D

RAMZAEV, P. V.
Some Regularities of Sr90 Accumulation in the Body of a Rat with a High Fluorine Content in Its Drinking Water, (In Russian),
W74-02195 5C

RANGO, A.
Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

RAO, D. B.
Unsteady Drawdown at a Partially Penetrating Well in a Transversely Isotropic Artesian Aquifer,
W74-02466 4B

RAO, G. G.
Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

RAO, G. V. V.
Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

RAO, V. P. R.
Extraction and Spectrophotometric Determination of Vanadium as a Mixed Ligand Complex of Oxine and Azide,
W74-02362 5A

RASMUSSON, M. E.
Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

RAVEH, A.
Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

RECHARD, P. A.
Evaporation from Snowdrifts Under Oasis Conditions,
W74-02183 2D

Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

REEVES, C. C. JR
Dynamics of Playa Lakes in the Texas High Plains,
W74-02598 7B

REEVES, R. D.
Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

REICHENBAUGH, R. C.
Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

REINIG, L. P.
Another Rio Grande for New Mexico,
W74-02461 3A

REYNOLDS, L. M.
Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

REYNOLDS, S. E.
State Water Plan,
W74-02457 6B

RICE, C. P.
Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

RIEDEL, P. H.
A New Oscillating Water Tunnel,
W74-02160 2J

A Shear Plate for Use in Oscillatory Flow,
W74-02161 2E

RIESSNER, O.
Manufacture of Capacitor Paper -- Some Problems with Fresh Water Preparation, (Erzeugung von Kondensatorpapier -- einige Probleme bei der Frischwasserherstellung),
W74-02247 5D

RITTER, J.
Plant Associations of the Southern Vercors Massive: Associations of Springs and Marshlands at Subalpine Elevation,
W74-02243 2I

RITTER, J. R.
Bolinas Lagoon, Marin County, California, Summary of Sedimentation and Hydrology, 1967-69,
W74-02296 2L

ROACH, J.
Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

RODENHUIS, G. S.
System 21, 'Jupiter' (A Design System for Two-Dimensional Nearly-Horizontal Flows),
W74-02159 7C

ROELS, O. A.
Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

ROLFSON, E. H.
Apparatus for Confining Floating Pollutants,
W74-02488 5G

ROLLER, N.
Monitoring Ocean Dumping with ERTS-1 Data,
W74-02580 7B

ROQUERO, C.
Detection of Major River Bed Changes in the River Ebro (North-Eastern Spain),
W74-02589 7B

ROSENFELD, A. S.
Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

ROSENSHEIN, J. S.
Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

ROSHCHINA, V. D.
Study of the Intracellular Water State in Plants Under the Effect of Phenols, (In Russian),
W74-02234 2I

ROSS, R. T.
The Determination of Methyl Mercury in Urine,
W74-02387 5A

ROSSI, G.
Analysis of High-Purity Water by Flameless Atomic-Absorption Spectroscopy. Part II. Signal Integration with a Non-Resonance Line Correction System for Spurious Absorption Phenomena,
W74-02385 5A

ROWE, G. R. JR
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

ROZYSKI, Z.
Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

RUDINGER, G.
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

RUDOLPH, N. S.
Water Resources Development in the Mullica River Basin,
W74-02450 5C

RUMER, R. R. JR
Adjustment of Friction in Hydraulic Models of Lakes,
W74-02314 2H

RUNNER, G. S.
Floods at Martinsburg and Vicinity, West Virginia,
W74-02615 2E

RUPPERT, R. W.
Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

RUSH, F. E.
Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

RUSSELL, D. A.
A Self-Draining Subsurface Rainfall Conservation System: Its Effect on the Soil Water Status and Productivity of Coastal Plains Sands,
W74-02193 2G

RUSSELL, O. R.
Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

SAITO, M.
A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

SAKKAS, J. G.
Dam-Break Flood in a Prismatic Dry Channel,
W74-02311 8B

SAMAAN, A. A.
Quantitative Estimation of Bottom Fauna in Lake Mariut,
W74-02549 2H

SAUNDERS, D. F.
Evaluation of Commercial Utility of ERTS-A Imagery in Structural Reconnaissance for Minerals and Petroleum,
W74-02567 7B

SAVAGE, A. E.
Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

SCARF, F.
Mapping Average Annual Surface Water Resources of the Hydrological Regions of Nelson, New Zealand,
W74-02290 2E

SCHATZBERG, P.
Investigation of Sorbents for Removing Oil Spills from Waters,
W74-02636 5G

SCHEUER, P. J.
Chemistry of Marine Natural Products,
W74-02189 5B

SCHLUTER, A.
Nuclear Magnetic Resonance Relaxation Titration,
W74-02402 2K

SCHUBERT, J. S.
Digital Analysis of Potomac River Basin ERTS Imagery: Sedimentation Levels at the Potomac-Anacostia Confluence and Strip Mining in Allegheny County, Maryland,
W74-02583 7B

SCHULZE, H. A.
Comparative Productivity Studies of Three Mecklenburg Lakes (Lake Kummerow, Lake Teterow and Lake Malchin), (In German),
W74-02558 2H

SCHUMANN, H. H.
Monitoring of Streamflow in the Verde River by ERTS-1 Data Collection System (DCS),
W74-02594 7B

SCHWARZ, J.
Use of Systems Approaches in Planning Israel's Water Resources Management,
W74-02352 6A

SCHWEISHEIMER, W.
Problems with Colored Papers: Are They a Cause of Pollution, (Probleme mit farbigen Papieren: Sind sie eine Ursache von Verschmutzung),
W74-02255 5B

SCIFRES, C. J.
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

SCOTT, R. G.
Elevation Dependent Model for Estimating Annual Runoff,
W74-02317 2A

SEIM, E. C.
A Study of Factors Influencing the Nitrogen and Phosphorus Contents of Nebraska Waters,
W74-02151 5B

SEIM, W. K.
Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

SELBY, M. J.
The Relationships Between Land Use and Erosion in the Central North Island, New Zealand,
W74-02287 4D

SEWELL, J. I.
The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

SHAFIK, T. M.
The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

SHCHERBAK, A. V.
Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

SHEN, M. C.
Two-Dimensional Waves Generated by a Surface Pressure Disturbance Over a Sloping Beach,
W74-02187 2E

SHIAU, J-C.
Adjustment of Friction in Hydraulic Models of Lakes,
W74-02314 2H

SHIELDS, C. I.
A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

SHIKAZE, K.
Characterization and Treatment of Fish Processing Plant Effluents in Canada,
W74-02262 5D

SHOUPP, W. J.
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

SHPORA, L. D.
Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

SIERKA, R. A.
The Use of Power Plant Heat in a Physical-Chemical Domestic Wastewater Renovation System,
W74-02208 5D

SIKKA, H. C.
Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

SIMM, K.
Use of Sephadex Gel for the Fractionation of Organic Matter in Lake Water, (In Russian),
W74-02343 5A

SIMON, F. O.
A Pneumatic Sample Changer for Gamma-Ray Spectroscopy,
W74-02407 7B

SIMON, L.
Influence of Soil Structure and Moisture on Nitrification,
W74-02192 2G

SINNOCK, S.
Recognition of Surface Lithologic and Topographic Patterns in Southwest Colorado with ADP Techniques,
W74-02562 7B

SIROTKIN, V. M.
Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

SKINNER, W. F.
The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

SMALE, B. C.
Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

SMALL, T. A.
Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

SMITH, L.
Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

SMITH, V. E.
Elevation Dependent Model for Estimating Annual Runoff,
W74-02317 2A

SNADDON, X. V. M.
Printout Colorimeter for Autoanalysis of Water Pollution,
W74-02374 5A

SOBSEY, M. D.
Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

SOLI, G.
Hydrocarbon-Oxidizing Bacteria and Their Possible Use as Controlling Agents of Oil Pollution in the Ocean,
W74-02618 5G

SOLOPENKO, L. I.
Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

SOMMERFELDT, T. G.
Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

SPIGARELLI, S. A.
Studies of the Sinking Plume Phenomenon,
W74-02644 5C

SPIRIDONOV, A. I.
Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

STAFFORD, D. B.
An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

STAGG, D. C.
Analysis by Means of Gas Bubble Electrification,
W74-02406 2K

STANKEWICH, M. J. JR
Nitrification of BOD-Containing Water,
W74-02485 5D

STEELE, A. K.
Distribution of Caesium-137 in British Coastal Waters,
W74-02365 5B

STEFFENSEN, R.
Structural Lineaments of Gaspe from ERTS Imagery,
W74-02565 7B

STEGER, R. D.
Annual Compilation and Analysis of Hydrologic Data for Calaveras and Escondido Creeks, San Antonio River Basin, Texas, 1971,
W74-02478 2E

STOERTZ, G. E.
Hydrogeology of Closed Basins and Deserts of South America, ERTS-1 Interpretations,
W74-02588 7B

STONE, J. E.
The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

STOUT, V. F.
The Use and Effect of Mixed Standards on the Quantitation of Polychlorinated Biphenyls,
W74-02393 5A

STRECKER, S.
Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

STRELKOFF, T.
Dam-Break Flood in a Prismatic Dry Channel,
W74-02311 8B

STRNAD, M.
Determination of the Mechanical Compatibility of Porous Rocks with Waste Water in its Subsurface Disposal,
W74-02165 5B

STRUEMPLER, A. W.
Adsorption Characteristics of Silber, Lead, Cadmium, Zinc, and Nickel on Borosilicate Glass, Polyethylene, and Polypropylene Container Surfaces,
W74-02412 5A

STUEBER, A. M.
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

STUPYNA, V. V.
Effect of Supernatant Fluid of the Ankistro-Desmus braunii Brunnth Culture on Development of Algae in Waste Waters of the Chernigov Chemical Fiber Industrial Group, (In Ukrainian),
W74-02245 5C

SUBRAMANYA, K.
Studies on Seepage from Canals with Partial Lining,
W74-02319 4A

SULLIVAN, A.
Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

SULLIVAN, W. T.
A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

SULTANKHODZHAYEV, A. N.
Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

SUNDARAM, T. R.
An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

SUZUKI, M.
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

SUZUKI, Y.
Accumulation of Strontium and Calcium in Freshwater Fishes of Japan,
W74-02197 5C

SWAN, P. N.
Challenges to Federalism: State Legislation Concerning Marine Oil Pollution,
W74-02502 5G

SWANSON, E. R.
Two Environmental Analyses Involving Agriculture,
W74-02166 5B

TABE, D. C.
Applicability of the Interceptor Waterway Concept to the Rookery Bay Sanctuary,
W74-02205 4A

TABLER, R. D.
An Enclosed Weir for Small Streams in Snow Country,
W74-02249 7B

TAGLIAFERRI, G.
Multi-Stage Flash Evaporator,
W74-02490 3A

TAKAHASHI, E.
On Mallomonas lelymeme Harris Et Bradley (Chrysophyceae), (In Japanese),
W74-02550 2H

TAKEUCHI, T.
Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

TANEYEV, R. N.
Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

TASOVAC, T.
A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

TAYLOR, T.
On the Origin of the Wet-Season Form of Zonocerus variegatus (L.) (Orth., Acrididae) In Southern Nigeria, with Some Biological Notes,
W74-02238 2I

TEAL, J. M.
Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

TEOTIA, M.
Relation of Mineral and Hormone Metabolism to Intake of Water with a High Natural Content of Fluoride,
W74-02235 5C

TEOTIA, S. P. S.
Relation of Mineral and Hormone Metabolism to Intake of Water with a High Natural Content of Fluoride,
W74-02235 5C

TEWARI, S. N.
Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

THAYER, P. S.
Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

THOMAS, G. E.
Evaluation of Commercial Utility of ERTS-A Imagery in Structural Reconnaissance for Minerals and Petroleum,
W74-02567 7B

THOMAS, G. H.
Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

THOMPSON, C. J.
Analyzing Heavy Ends of Crude,
W74-02378 5A

THOMSON, F. H.
Water Resources of Lee County, Mississippi,
W74-02340 4B

THOMSON, H. M.
Comments on the Paper by G. W. Kwant 'Sixteen Years of Water Fluoridation in The Netherlands and Its Influence on Dental Decay,'
W74-02230 5F

THORNTON, I.
The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

TIAGI, G. K.
Relation of Mineral and Hormone Metabolism to Intake of Water with a High Natural Content of Fluoride,
W74-02235 5C

TIBBS, J. F.
Description, Distribution, and Ecology of the Rotifer and Crustacean Plankton Communities, Flathead Lake, Montana,
W74-02448 2H

TIMMONS, J. F.
Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

TOBIAS, L.
Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

TOBIAS, R. F.
Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

TOEBES, C.
The Water Balance of New Zealand,
W74-02291 2A

TOFFLEMIRE, T. J.
Survey of Methods of Treating Wine and Grape Waste Water,
W74-02329 5D

TONTANI, Y.
On the Characteristics of Salt Intrusion in the Kitakami River, Miyagi Prefecture (In Japanese),
W74-02541 5B

TORRENT, J.
Detection of Major River Bed Changes in the River Ebro (North-Eastern Spain),
W74-02589 7B

TROITSKAYA, M. N.
Some Regularities of Sr90 Accumulation in the Body of a Rat with a High Fluorine Content in Its Drinking Water, (In Russian),
W74-02195 5C

TSUCHIYA, K.
Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

TSVETKOVA, L. G.
Dry Activated Sludge as Fertilizer for Winter Wheat and Corn, (Sukhoi aktivnyi il kak udobrenie dlya posevov ozimi pshenits' i kukuruz'),
W74-02270 5D

TURNER, R. M.
Use of the Sri Electronic Satellite Image Analysis Console for Mapping Southern Arizona Plant Communities from ERTS-1 Imagery,
W74-02593 7B

TYAGI, A. K.
Water Quality Management in Groundwater Basins,
W74-02356 5B

TYMINSKIY, V. G.
Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

UEDA, T.
Accumulation of Strontium and Calcium in Freshwater Fishes of Japan,
W74-02197 5C

UENO, A.
Process for Removal of Contaminants from Wastes,
W74-02487 5D

UKLONSKIY, A. S.
Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

UMAROVA, G. KH.
Chemical Characteristics of Surface Waters in the Upper Chirchik River Basin (Khimicheskaya kharakteristika poverkhnostnykh vod verkhney chasti basseyna r. Chirchik),
W74-02612 2K

UPPSTROM, L.
Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

USAKOV, V. A.
Age Structure of Populations of Some Amphibia on Banks of Water Reservoirs (In Czech),
W74-02650 2H

USHAKOV, V. A.
The Age Group Distribution of Pelobates fuscus (Laur.) at the Kuibyshev Reservoir Shores (In Russian),
W74-02641 2H

VAN DER LINDEN, W. E.
Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

VAN LIERE, W. J.
Applications of Multispectral Imagery to Water Resources Development Planning in the Lower Mekong Basin (Khemer Republic, Laos, Thailand and Viet-Nam),
W74-02590 7B

VAN TRIES, B. J.
An Evaluation of Space Acquired Data as a Tool for Management of Wildlife Habitat in Alaska,
W74-02596 7B

VARDI, Y.
Use of Systems Approaches in Planning Israel's Water Resources Management,
W74-02352 6A

VILJOEN, M. J.
ERTS-1 Imagery as an Aid to the Definition of the Geotectonic Domains of the Southern African Crystalline Shield,
W74-02563 7B

VILJOEN, R. P.
ERTS-1 Imagery as an Aid to the Definition of the Geotectonic Domains of the Southern African Crystalline Shield,
W74-02563 7B

VISMAN, YA. I.
Using the Adsorption Method on Activated Charcoal with Chloroform Extraction (CCE) for Evaluating Water Pollution by Organic Substances, (In Russian),
W74-02232 5B

VON BRAUNSCHWEIG, C.
The Effect of Soil Moisture Upon the Availability of Potassium and its Influence on the Growth of Young Maize Plants (Zea mays L.),
W74-02554 3F

VRANOVSKY, M.
Some Further Results of the Zooplankton Studies in the Czechslovak-Hungarian Stretch of the Danube,
W74-02545 2I

WACKWITZ, L. K.
Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

WADE, R. L.
High Precision Sampling for Chromatographic Separations,
W74-02414 2K

WADE, T.
Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

WAGNER, L. A.
Flood of June 1972 at Corning, New York,
W74-02479 7C

WAGNER, T. W.
Progress of an ERTS-1 Program for Lake Ontario and its Basin,
W74-02600 7B

WALDEN, C. C.
Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

WALLIS, C.
Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

WALLIS, J. R.
A Bayesian Decision Framework for Synthetic Hydrology,
W74-02438 6A

WALRAVEN, G. O.
Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

WALTER, C. M.
Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

WALTER, W. G.
Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

WANG, L. K.
Cost Effectiveness in Pollution Control--Treatment of Glue Factory Wastes by Carbon Adsorption System,
W74-02177 5D

Mathematical Relationships of BOD Removal in Activated Sludge Process,
W74-02176 5D

Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

WANG, M. H.
Mathematical Relationships of BOD Removal in Activated Sludge Process,
W74-02176 5D

WANG, W. C.
A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

WARD, C. C.
Analyzing Heavy Ends of Crude,
W74-02378 5A

WARREN, C. E.
Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

WARREN, W. M.
Aerial Remote Sensing of Carbonate Terranes in Shelby County, Alabama,
W74-02467 7B

WASSON, B. E.
Water Resources of Lee County, Mississippi,
W74-02340 4B

WATANABE, K.
On the Variation of Salinity Distribution in a Reservoir, Situated in Reclaimed Land, (Japanese),
W74-02246 2H

Polluted and Turbid Water Masses in Osaka Bay and Its Vicinity Revealed with ERTS-A Imageries,
W74-02586 7B

WATANABE, S.
A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

WATT, W. E.
The Turbulent Temperature Mixing Layer,
W74-02162 8B

WATTS, G. M.
Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

WAY, C.
A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

WEBER, A. H.
Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

WEDEMEYER, W. G.
Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

WEIDMAN, R. M.
Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

WEISS, A.
Nuclear Magnetic Resonance Relaxation Titration,
W74-02402 2K

WEST, T. S.
Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

WESTLY, R. L.
Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

WEZERNAK, C. T.
Monitoring Ocean Dumping with ERTS-1 Data,
W74-02580 7B

WHEATSTONE, K. C.
The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

WHITE, E. M.
Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 5B

WIELCHOWSKY, C. C.
Aerial Remote Sensing of Carbonate Terranes in Shelby County, Alabama,
W74-02467 7B

WIER, C. W.
Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

WIGHTMAN, J. M.
Detection, Mapping and Estimation of Rate Spread of Grass Fires from Southern African ERTS-1 Imagery,
W74-02576 7B

WILEY, A. J.
Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

WILLIAMS, J. L.
Optimization of Industrial Systems with the Separable Programming and the Generalized Reduced Gradient Methods,
W74-02213 5G

WILLIAMS, J. R.
Hymo: Problem-Oriented Computer Language for Hydrologic Modeling--Users Manual,
W74-02469 2A

WILLIAMS, P. J. LEB.
Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

WILLIAMS, R. W.
Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

WILLIAMS, T. T.
Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

WILLIAMSON, E. J.
Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 5B

WILLIS, G. H.
Agricultural Chemicals in Surface Runoff, Ground Water, and Soil: 1. Endrin,
W74-02152 5B

WITHINGTON, C. F.
Lineaments in Coastal Plain Sediments as Seen in ERTS Imagery,
W74-02566 7B

WITTLER, G.
Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

WOBBER, F. J.
Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

WOJTOWICZ, E.
Cleanliness of Wells, Chemical Substances in Drinking Water and Their Relation to Caries (In Polish),
W74-02544 5C

WOMACK, J. D.
Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

WOODWARD, D. E.
Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

WOOLSON, E. A.
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

WOOSTER, W. S.
Scientific Aspects of Maritime Sovereignty Claims,
W74-02498 6E

WORK, E. A. JR
Preliminary Evaluation of ERTS-1 for Determining Numbers and Distribution of Prairie Ponds and Lakes,
W74-02597 7B

WORSTELL, R. U.
Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

WRIGHT, J. F. JR
Flood Control Project Maintenance and Repair--1970 Inspection Report,
W74-02617 2E

WRIGHT, R. S.
Color Removal from Kraft Pulp Mill Effluents by Massive Lime Treatment,
W74-02284 5D

YA-E, MASA-O.
Study on the Plasmolysis Time in Epidermal Cells from Leaves of Saxifraga stolonifera Meerb (In Japanese),
W74-02542 2I

YAMABE, T.
Ion-Exchange Separations on Mixed Columns,
W74-02398 5A

YAMAMOTO, Y.
A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

YARGER, H. L.
Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

YATAZAWA, M.
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

YESENBEKOV, A.
A Study of Items in the Groundwater Balance of Waterlogged Areas (Ob uzuchenii elementov balansa gruntovykh vod no zabolochennykh uchastkakh),
W74-02610 2D

YEVJEVICH, V.
New Vistas for Flood Investigations,
W74-02625 2E

YOUNG, R. H. F.
Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

YOUNGS, W.
Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

YUNGHANS, R.
Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

ZARIC, M.
Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

ZEBEC, M.
Limnological Characteristics of Jezero on the Island of Krk, (In Serbo-Croatian),
W74-02386 2H

ZIEGELBECKER, R.
Comments on the Paper by G. W. Kwant 'Sixteen Years of Water Fluoridation in The Netherlands and Its Influence on Dental Decay,'
W74-02230 5F

ZIEGLER, R. C.
Cost Effectiveness in Pollution Control--Treatment of Glue Factory Wastes by Carbon Adsorption System,
W74-02177 5D

In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

ZIEGLER, R. C.

Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

ZINK, L. B.
Population Projectsions for the New Mexico State Water Plan,
W74-02458 6B

ORGANIZATIONAL INDEX

AGRICULTURAL RESEARCH SERVICE, BATON ROUGE, LA.
Agricultural Chemicals in Surface Runoff, Ground Water, and Soil: 1. Endrin,
W74-02152 5B

AGRICULTURAL RESEARCH SERVICE, BELTSVILLE, MD. AGRICULTURAL ENVIRONMENTAL QUALITY INST.
Chlorodioxins in Pesticides, Soils, and Plants,
W74-02371 5B

AGRICULTURAL RESEARCH SERVICE, FORT COLLINS, COLO.
Picloram Photolytic Decomposition,
W74-02383 5B

AGRICULTURAL RESEARCH SERVICE, FRESNO, CALIF. GROUND WATER RECHARGE FIELD STATION.
Ground-Water Recharge for Urban Use: Leaky Acres Project,
W74-02468 4B

AGRICULTURAL RESEARCH SERVICE, KERRVILLE, TEX. LIVESTOCK INSECTS LAB.
Gas-Liquid Chromatographic Determination of Chlorfenvinphos in Milk, Eggs, and Body Tissues of Cattle and Chickens,
W74-02384 5A

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ. WATER CONSERVATION LAB.
Trickle Irrigation on Cotton,
W74-02347 3F

AGRICULTURAL RESEARCH SERVICE, RIESEL, TEX.
Hymo: Problem-Oriented Computer Language for Hydrologic Modeling--Users Manual,
W74-02469 2A

AGRICULTURAL RESEARCH SERVICE, UNIVERSITY PARK, PA. NORTHEAST WATERSHED RESEARCH CENTER.
Hurricane Agnes Floods East Mahantango Creek,
W74-02174 2E

AGROFIZICHESKII NAUCHNO-ISSLEDOVATELSKII INSTITUT, LENINGRAD (USSR).
Design, Operation, and Temperature Sensitivity of A Thermocouple Psychrometer Moisture Potentiometer Based on the Peltier Effect, (Konstruktsiya, metodika primeneniya i temperaturnaya chuvstvitel'nost' termoparnogo psikhrometrichesko go vlagopotentsiometra, osnovannogo na effekte Pel't'ye),
W74-02303 2G

Investigation of the Relation Between Moisture Potential and 'Reduced Film Thickness' for Disperse Systems with Nonporous Particles, (Issledovaniye zavisimosti mezhdu potentsialom vlazhnosti i 'privedennoy tolshchincy plenki' dlya di spersnykh sistem s neporistymi chastitsami),
W74-02304 2G

AIN SHAMS UNIV., CAIRO (EGYPT). DEPT. OF SOILS.
Factors Affecting the Manganese Status in Soils of the U.A.R.,
W74-02200 2G

AKADEMIYA NAUK ESTONSKOI SSR, TARTU. INST. OF ZOOLOGY AND BOTANY.
Use of Sephadex Gel for the Fractionation of Organic Matter in Lake Water, (In Russian),
W74-02343 5A

AKADEMIYA NAUK SSSR, MOSCOW. INST. OF EVOLUTIONARY MORPHOLOGY AND ANIMAL ECOLOGY.
Some Characteristics of Cesium-137 Accumulation in Populations of Freshwater Fish, (In Russian),
W74-02196 5C

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT BIOLOGII VNUTRENNYKH VOD.
Effect of Heated Water from Konakov Hydro-Electric Station on Oxygen Content and Development of Phytoplankton in Ivan'Kovskoe Reservoir During Winter, (In Russian),
W74-02244 5B

The Ability of Bacteria to Mineralize Algae Organic Matter, (In Russian),
W74-02252 5B

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT GEOGRAFII.
Bear Glacier Has Come Alive (Lednik Medvezhiy ozhil),
W74-02614 2C

AKADEMIYA NAUK SSSR, MOSCOW. POCHVENNYI INSTITUT.
Migration of Substances with Surface and Gravitational Waters in Soils of Geochemically Related Landscapes of Baraba, (Migratsiya veshchestv s pverkhnostnymi i gravitatsionnymi vodami v pochvakh geokhimicheski sopryazhennykh landshaftov Baraby),
W74-02300 2G

AKADEMIYA NAUK TADZHIKSKOI SSSR, DUSHANBE. INSTITUT ZOOLOGII I PARAZITOLOGII.
Microflora and Chemical Composition of the Bottom Deposits of the Kairak-Kum Reservoir, (In Russian),
W74-02253 5B

AKADEMIYA NAUK UBZEKSKOI SSR, TASHKENT. INSTITUT SEISMOLOGII.
Chemical Characteristics of Surface Waters in the Upper Chirchik River Basin (Khimicheskaya kharakteristika poverkhnostnykh vod verkhney chasti basseyna r. Chirchik),
W74-02612 2K

AKADEMIYA NAUK URSR, KIEV. INSTYTUT BOTANIKI.
Effect of Supernatant Fluid of the Ankistro-Desmus braunii Brunnth Culture on Development of Algae in Waste Waters of the Chernigov Chemical Fiber Industrial Group, (In Ukrainian),
W74-02245 5C

AKADEMIYA NAUK URSR, SEVASTOPOL. MARINE HYDROPHYSICS INST.
Surface and Internal Waves, (Poverkhnostnyye i vnutrenniye volny),
W74-02299 2E

AKADEMIYA NAUK UZBEKSKOI SSR, TASHKENT. INSTITUT SEISMOLOGII.
A Hydrogeothermal Description of Groundwater in Upper Cretaceous Deposits in the Southeast Aral Sea Area (Gidrogeotermicheskaya kharakteristika podzemnykh vod verkhnego mela Yugo-Vostochnogo Priaral'ya),
W74-02609 2F

Some Problems in Age Determination of Groundwater (Nekotoryye voprosy rascheta vozrasta podzemnykh vod),
W74-02611 2F

AKADEMIYA NAUK UZBEKSKOI SSR, TASHKENT. INSTITUT ZOOLOGII I PARAZITOLOGII.
Grasshoppers and Crickets in the Karshi Steppe, (In Russian),
W74-02239 3F

ALBERTA UNIV., EDMONTON. DEPT. OF CIVIL ENGINEERING.
Bed Scour at End-Dump Channel Constrictions,
W74-02316 8B

ALEXANDRIA INST. OF OCEANOGRAPHY AND FISHERIES (EGYPT).
Quantitative Estimation of Bottom Fauna in Lake Mariut,
W74-02549 2H

AMERICAN UNIV., WASHINGTON D.C. DEPT. OF BIOLOGY.
Mapping Atlantic Coastal Marshlands, Maryland, Georgia, Using ERTS-1 Imagery,
W74-02577 7B

Digital Analysis of Potomac River Basin ERTS Imagery: Sedimentation Levels at the Potomac-Anacostia Confluence and Strip Mining in Allegheny County, Maryland,
W74-02583 7B

AMSTERDAM UNIV. (NETHERLANDS). PHYSICS LAB.
Selection of Experimental Conditions for the Photometric Complex Formation Titrations of Metals in the PPM-Range,
W74-02404 5A

ANDERSON-NICHOLS AND CO., INC., CONCORD, N.H.
Regional Wastewater Facilities Study.
W74-02338 5D

ANDHRA UNIV., WALTAIR (INDIA). DEPT. OF CHEMISTRY.
Extraction and Spectrophotometric Determination of Vanadium as a Mixed Ligand Complex of Oxine and Azide,
W74-02362 5A

Microdetermination of Arsenic (III) and Osmium (VIII) through Osmium-Thiourea Reaction,
W74-02396 5A

ARGONNE NATIONAL LAB., ILL. CENTER FOR ENVIRONMENTAL STUDIES.
Studies of the Sinking Plume Phenomenon,
W74-02644 5C

ARIZONA INTERAGENCY RANGE TECHNICAL SUB-COMMITTEE, TUCSON.
Guide to Improvement of Arizona Rangeland.
W74-02349 4A

ARIZONA UNIV., TUCSON.
The Importance of Sediment Transport in Water Resources Planning,
W74-02351 4D

ARIZONA UNIV., TUCSON. DEPT. OF CIVIL ENGINEERING AND ENGINEERING MECHANICS.
The Use of Power Plant Heat in a Physical-Chemical Domestic Wastewater Renovation System,
W74-02208 5D

ARIZONA UNIV., TUCSON. DEPT. OF HYDROLOGY AND WATER RESOURCES.
Water Quality Management in Groundwater Basins,
W74-02356 5B

ARIZONA UNIV., TUCSON. DEPT. OF SOILS, WATER AND ENGINEERING.
A Way to Make the Desert Green,
W74-02346 3B

Use of Digital Computer Techniques in Water Resources Data Storage,
W74-02357 4B

ARIZONA UNIV., TUCSON. DEPT. OF SYSTEMS ENGINEERING.
Input Specifications to Stochastic Decision Models,
W74-02209 2E

ARIZONA UNIV., TUCSON. ENVIRONMENTAL RESEARCH LAB.
The Use of Desalted Seawater for Intensive Agricultural Applications, (El Uso de Agua de Mar Desalada Para Intensivas Aplicaciones Agricolas),
W74-02359 3A

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C.
Use of ERTS-1 in Coastal Studies,
W74-02633 2L

Wave Breaking in Shallow Water,
W74-02638 2L

Design Considerations for a 3-D Laser Doppler Velocimeter for Studying Gravity Waves in Shallow Water,
W74-02642 2L

Bulletin and Summary of Research Progress Fiscal Years 1970-71.
W74-02647 2L

ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL (ENGLAND).
Ultrasonic River Flow Measurement,
W74-02250 2E

AUBURN UNIV. ALA. DEPT. OF CHEMISTRY.
Nature and Stability of Complex Mercury Compounds in Surface and Ground Waters,
W74-02441 5A

AUBURN UNIV., ALA. DEPT. OF CIVIL ENGINEERING.
Water-Treatment-Sludge Filtration Studies,
W74-02440 5D

AUBURN UNIV., ALA. WATER RESOURCES RESEARCH INST.
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Steel Industry,
W74-02437 5D

BAYER A. G., LEVERKUSEN (WEST GERMANY).
Removal of Organic Matter from Water by Resinous Adsorbents,
W74-02266 5D

BAYLOR COLL. OF MEDICINE, HOUSTON, TEX. DEPT. OF VIROLOGY AND EPIDEMIOLOGY.
Concentration of Enteroviruses from Large Volumes of Water,
W74-02271 5F

BENDIX CORP., ANN ARBOR, MICH.
ERTS-1 Investigation of Ecological Effects of Strip Mining in Eastern Ohio,
W74-02572 7B

BIRMINGHAM UNIV. (ENGLAND). DEPT. OF CHEMISTRY.
Analytical Applications of Gas Chromatography of Metal Chelates,
W74-02366 2K

BONN UNIV. (WEST GERMANY). INSTITUT FUER PHYSIKALISCHE CHEMIE.
Potentiality of the Coupling of Column Liquid Chromatography and Field Desorption Mass Spectrometry,
W74-02430 2K

BRITISH COKE RESEARCH ASSOCIATION, CHESTERFIELD (ENGLAND).
The Determination of Phenols in Aqueous Effluents,
W74-02417 5A

BRITISH COLOMBIA RESEARCH COUNCIL, VANCOUVER.
Measuring Stress in Fish Exposed to Pulp Mill Effluents,
W74-02276 5C

BROWN, BOVERI UND CIE, A.G., HEIDELBERG (WEST GERMANY).
Detection of Pollutants in Water by Raman Spectroscopy,
W74-02164 5A

BUENOS AIRES UNIV. (ARGENTINA). FACULTED DE AGRONOMIA Y VETERINARIA.
Agroclimatic Areas for Wheat and Bioclimatic Characteristics of its Cultivars in Uruguay, (In Spanish),
W74-02354 3F

BUNDESANSTALT FUER BODENFORSCHUNG, HANOVER (WEST GERMANY).
Groundwater Exploration and Provision from the Hydrogeological Point of View,
W74-02353 4B

BUNDESANSTALT FUER WASSERBIOLOGIE UND ABWASSERFORSCHUNG, VIENNA (AUSTRIA).
A Comparison of the Content of Microelements in the Water of the River Danube Near Vienna and Belgrade for 1961-1970 (Ein Vergleich des Gehaltes an Spurenelementen im Donauwasser bei Wien und Beograd fue 1961-1970),
W74-02436 5A

BUREAU OF MINES, BARTLESVILLE, OKLA. BARTLESVILLE ENERGY RESEARCH CENTER.
Analyzing Heavy Ends of Crude,
W74-02378 5A

BUREAU OF RECLAMATION, WASHINGTON, D.C.
Evolving Water Policy and Management in the United States,
W74-02358 6B

BUREAU OF SPORT FISHERIES AND WILDLIFE, WASHINGTON, D.C.
An Evaluation of Space Acquired Data as a Tool for Management of Wildlife Habitat in Alaska,
W74-02596 7B

CAIRO UNIV., GIZA (EGYPT). FACULTY OF SCIENCE.
Applications, Involving the Iodide Ion. VIII. Direct and Indirect Determination of Mercury (I) and Analysis of Mixtures. Analysis of Chromium (VI)-Chromium (III) Mixtures. Determination of Hypochlorite,
W74-02395 5A

Ecological and Phytosociological Study of a Sector in the Lybian Desert,
W74-02507 2I

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO.
Flood Control Funds -- 1970 Report to the Legislature.
W74-02292 6C

Flood Control Project Maintenance and Repair--1970 Inspection Report,
W74-02617 2E

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO. DIV. OF RESOURCES DEVELOPMENT.
Weather Modification Operations In California, October 1, 1970-September 30, 1971,
W74-02293 3B

California High Water, 1970-1971,
W74-02474 2E

CALIFORNIA UNIV., BERKELEY. SCHOOL OF FORESTRY AND CONSERVATION.
Prescribed Fire Effects on Water Repellency, Infiltration and Retention in Mixed-Conifer Litter, Duff and Soil,
W74-02442 4C

CALIFORNIA UNIV., DAVIS. DEPT. OF ENGINEERING.
Dam-Break Flood in a Prismatic Dry Channel,
W74-02311 8B

CALIFORNIA UNIV., RIVERSIDE. DEPT. OF GEOGRAPHY.
A New Fault Lineament in Southern California,
W74-02570 7B

CALSPAN CORP., BUFFALO, N.Y.
Treatment of Tannery Effluents by Physical-Chemical Processes,
W74-02175 5D

Mathematical Relationships of BOD Removal in Activated Sludge Process,
W74-02176 5D

Cost Effectiveness in Pollution Control--Treatment of Glue Factory Wastes by Carbon Adsorption System,
W74-02177 5D

An Investigation of the Physical Effects of Thermal Discharges into Cayuga Lake,
W74-02178 5B

In Situ Treatment Methods for Hazardous Material Spills,
W74-02179 5D

Persistent Sea-Foam Masses -- A Problem Solved,
W74-02180 5B

Surface Quality Assessment of Natural Bodies of Water,
W74-02181 5A

Organic Films on Natural Waters: Their Retrieval, Identification, and Modes of Elimination,
W74-02182 5A

CAMP, DRESSER AND MCKEE, BOSTON, MASS.
Cost Effectiveness of Current Environmental Engineering Practices,
W74-02225 5D

CANADA PACKERS LTD., TORONTO (ONTARIO). RESEARCH AND DEVELOPMENT LABS.
Analysis of Alkyl Ethoxylates by NMR,
W74-02408 5A

CARBONDALE DEPT. OF PUBLIC WORKS, ILL.
Fourth Annual Report, City of Carbondale, Illinois, Water and Wastewater Treatment.
W74-02328 5D

CHADRON STATE COLL., NEB.
Adsorption Characteristics of Silber, Lead, Cadmium, Zinc, and Nickel on Borosilicate Glass, Polyethylene, and Polypropylene Container Surfaces,
W74-02412 5A

CHATHAM COUNTY-SAVANNAH METROPOLITAN PLANNING COMMISSION, SAVANNAH, GA.
Water and Sewerage Improvements Needed in 1975 in Chatham County, Georgia.
W74-02186 5D

CHEMICAL EXAMINER'S LAB., AGRA (INDIA). TOXICOLOGY DIV.
Separation and Identification of Metal Dithizonates by Thin-Layer Chromatography and its Application in Toxicological Analysis,
W74-02360 5A

CHEMVIRON S.A., BRUSSELS (BELGIUM).
Removal of Organic Material by Adsorption on Activated Carbon,
W74-02264 5D

CHICAGO BRIDGE AND IRON CO., OAK BROOK, ILL. (ASSIGNEE).
Underwater Tanker Ballast Water/Oil Separation,
W74-02492 5G

CHICAGO MEDICAL SCHOOL, ILL. DEPT. OF MICROBIOLOGY.
Frequency of Fish Tumors Found in a Polluted Watershed as Compared to Nonpolluted Canadian Waters,
W74-02401 5C

CITIES SERVICE OIL CO., TULSA, OKLA. (ASSIGNEE).
Oil Skimming Apparatus,
W74-02491 5G

CLEMSON UNIV., S.C.
Stability and Removal of Commercial Dyes from Process Wastewater,
W74-02429 5B

CLEMSON UNIV., S.C. DEPT. OF CIVIL ENGINEERING.
An Annotated Bibliography of Aerial Remote Sensing in Coastal Engineering,
W74-02646 2L

COASTAL PLAINS CENTER FOR MARINE DEVELOPMENT SERVICES, WILMINGTON, N.C.
Guidelines for the Coastal Zone.
W74-02510 2L

COLLEGE OF SOUTH JERSEY, CAMDEN. DEPT. OF ZOOLOGY.
Water Resources Development in the Mullica River Basin,
W74-02450 5C

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
New Vistas for Flood Investigations,
W74-02625 2E

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF ECONOMICS.
Legal and Institutional Constraints in Consolidating Irrigation Systems,
W74-02533 3F

COLUMBIA UNIV., NEW YORK. GRADUATE SCHOOL OF BUSINESS.
Ocean Science and Mutual Assistance: An Uneasy Alliance,
W74-02500 6E

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, CANBERRA (AUSTRALIA).
On Solving the Unsaturated Flow Equation: The Flux-Concentration Relation,
W74-02464 2G

CONNECTICUT UNIV., STORRS. DEPT. OF CIVIL ENGINEERING.
Quick-Time Instrumental Measurements of Wastewater Organic Characteristics,
W74-02170 5A

CORNELL UNIV., ITHACA, N.Y.
Computer Simulation of Trophic Level Interrelationships in Cayuga Lake,
W74-02216 5C

Experimental Studies on Phytoplankton Succession in Cayuga Lake,
W74-02217 5C

COURTAULDS LTD., COVENTRY (ENGLAND). RESEARCH DIV.
Effluent Treatment at Man-Made Fibre Production Units,
W74-02263 5D

CROWN ZELLERBACH CORP., CAMAS, WASH. ENVIRONMENTAL SERVICES DIV.
Pulp and Paper Mill Sludge Utilization and Disposal,
W74-02278 5D

DANISH HYDRAULIC INST., COPENHAGEN. COMPUTATIONAL HYDRAULICS CENTER.
System 21, 'Jupiter' (A Design System for Two-Dimensional Nearly-Horizontal Flows),
W74-02159 7C

DELAWARE UNIV., NEWARK.
Research in the Coastal and Oceanic Environment,
W74-02481 2L

DELAWARE UNIV., NEWARK. COLL. OF MARINE STUDIES.
A Mass Balance Model of Trace Metals in Several Delaware Watersheds,
W74-02443 5B

Identification of Marsh Vegetation and Coastal Land Use in ERTS-1 Imagery,
W74-02578 7B

DELAWARE UNIV., NEWARK. DEPT. OF GEOLOGY.
Geologic Control of Ground Water Movement in a Portion of the Delaware Piedmont,
W74-02320 2F

DEPARTMENT OF AGRICULTURE, LETHBRIDGE (ALBERTA). RESEARCH STATION.
Effect of Feedlot Manure on Soil and Water Quality,
W74-02157 5B

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO).
Characterization and Treatment of Fish Processing Plant Effluents in Canada,
W74-02262 5D

The CPAR Program - Government-Industry Cooperation in Pollution Abatement Research,
W74-02274 5D

Legal Developments in Canadian Water Management,
W74-02505 6E

DEPARTMENT OF THE NAVY, WASHINGTON, D.C.
Floating Water Jet for Oil Slick Control,
W74-02494 5G

DOW CHEMICAL CO., MIDLAND, MICH. HALOGENS RESEARCH LAB.
Rates and Products of Decomposition of 2,2-Dibromo-3-Nitrilopropionamide,
W74-02382 5B

DURHAM UNIV. (ENGLAND). DEPT. OF GEOGRAPHY.
River Regimes in Iran,
W74-02298 2E

EARTH SATELLITE CORP., WASHINGTON, D.C. GEOSCIENCES AND ENVIRONMENTAL APPLICATIONS DIV.
Application of ERTS-1 Data to the Protection and Management of New Jersey's Coastal Environment,
W74-02579 7B

ECODYNE CORP., CHICAGO, ILL. (ASSIGNEE).
Method for Removing Suspended Solids from Liquids,
W74-02484 5D

ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST (UN), BANGKOK (THAILAND). MEKONG COMMITTEE SECRETARIAT.
Applications of Multispectral Imagery to Water Resources Development Planning in the Lower Mekong Basin (Khemer Republic, Laos, Thailand and Viet-Nam),
W74-02590 7B

EDGEWOOD ARSENAL, ABERDEEN PROVING GROUND, MD.
Detection and Estimation of Isopropyl Methylphosphonofluoridate and O-Ethyl S-

EDGEWOOD ARSENAL, ABERDEEN PROVING GROUND, MD.

Diisopropylaminoethylmethylphosphonothioate in Seawater in Parts-Per-Trillion Level,
W74-02427 5A

ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA. SURVEILLANCE AND ANALYSIS DIV.
A Report on Bacterial Pollution Affecting Shellfish Harvesting in Newport River, North Carolina.
W74-02621 5B

ENVIRONMENTAL PROTECTION AGENCY, KANSAS CITY, MO. REGION VII.
Mercury in Fish, Sediments, and Water in Lake Oahe, South Dakota,
W74-02423 5A

ENVIRONMENTAL PROTECTION AGENCY, PERRINE, FLA. PERRINE PRIMATE LAB.
The Determination of Methyl Mercury in Urine,
W74-02387 5A

The Determination of Pentachlorophenol and Hexachlorophene in Human Adipose Tissue,
W74-02391 5A

ENVIRONMENTAL RESEARCH AND TECHNOLOGY, INC., LEXINGTON, MASS.
Use of ERTS Data for Mapping Snow Cover in the Western United States,
W74-02603 7B

ENVIRONMENTAL RESEARCH INST. OF MICHIGAN, ANN ARBOR.
Monitoring Ocean Dumping with ERTS-1 Data,
W74-02580 7B

Preliminary Evaluation of ERTS-1 for Determining Numbers and Distribution of Prairie Ponds and Lakes,
W74-02597 7B

Progress of an ERTS-1 Program for Lake Ontario and its Basin,
W74-02600 7B

EUROPEAN ATOMIC ENERGY COMMUNITY, ISPRA (ITALY). JOINT NUCLEAR RESEARCH CENTER.
Analysis of High-Purity Water by Flameless Atomic-Absorption Spectroscopy. Part II. Signal Integration with a Non-Resonance Line Correction System for Spurious Absorption Phenomena,
W74-02385 5A

FLUOR CORP. LTD., LOS ANGELES, CALIF.
'Clean Energy Via Coal Gasification',
W74-02462 6B

FOREST MANAGEMENT INST., OTTAWA (ONTARIO).
Detection, Mapping and Estimation of Rate Spread of Grass Fires from Southern African ERTS-1 Imagery,
W74-02576 7B

FOREST RESEARCH INST., DEHRA DUN (INDIA). FOREST ENTOMOLOGY BRANCH.
The Phenology of Dragonflies in the Dehra Dun Valley, India,
W74-02237 2I

FOREST SERVICE (USDA), FORT COLLINS, COLO. ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Hydrologic Simulation Model of Colorado Subalpine Forest,
W74-02248 7B

An Enclosed Weir for Small Streams in Snow Country,
W74-02249 7B

Predicting Avalanche Intensity from Weather Data: A Statistical Analysis,
W74-02294 2C

Hyperbolic Stress Equations for Compressible Slabs,
W74-02624 2C

FOREST SERVICE (USDA), MADISON, WIS. FOREST PRODUCTS LAB.
Bacterial Protein from Paper Mill Sludges,
W74-02282 5E

FOREST SERVICE (USDA), TEMPE, ARIZ. FOREST HYDROLOGY LAB.
Evapotranspiration and Watershed Research as Related to Riparian and Phreatophyte Management--An Abstract Bibliography.
W74-02630 2D

FRESHWATER BIOLOGICAL ASSOCIATION, WAREHAM (ENGLAND). RIVER LAB.
The Chemical Composition and Flow of the South Winterbourne in Dorset,
W74-02190 2K

GEOLOGICAL SURVEY, ARLINGTON, VA.
Remote Sensing of Turbidity Plumes in Lake Ontario,
W74-02601 7B

GEOLOGICAL SURVEY, AUSTIN, TEX.
Annual Compilation and Analysis of Hydrologic Data for Urban Studies in the Houston, Texas Metropolitan Area, 1971,
W74-02471 2E

Groundwater Resources of Val Verde County, Texas,
W74-02620 2F

GEOLOGICAL SURVEY, AUSTIN, TEX. WATER RESOURCES DIV.
Annual Compilation and Analysis of Hydrologic Data for Little Elm Creek, Trinity River Basin, Texas, 1971,
W74-02477 2E

Annual Compilation and Analysis of Hydrologic Data for Calaveras and Escondido Creeks, San Antonio River Basin, Texas, 1971,
W74-02478 2E

Annual Compilation and Analysis of Hydrologic Data for Green Creek, Brazos River Basin, Texas, 1971,
W74-02626 4D

GEOLOGICAL SURVEY, BLOOMINGTON, IND.
Fracture Mapping and Strip Mine Inventory in the Midwest by Using ERTS-1 Imagery,
W74-02571 7B

GEOLOGICAL SURVEY, CARSON CITY, NEV.
Water-Resources Appraisal of Fish Lake Valley, Nevada and California,
W74-02616 2A

GEOLOGICAL SURVEY, DENVER, COLO.
Assessment of Flood Damage in Arizona by Means of ERTS-1 Imagery,
W74-02592 7B

GEOLOGICAL SURVEY, HARRISBURG, PA.
Preliminary Analysis of ERTS-Relayed Water-Resources Data in the Delaware River Basin,
W74-02595 7B

GEOLOGICAL SURVEY, LAKEWOOD, COLO.
Proposed Water-Resources and Land-Capability Investigation, Arusha Region, Tanzania,
W74-02627 2A

GEOLOGICAL SURVEY, LAWRENCE, KANS.
Water Turbidity Detection Using ERTS-1 Imagery,
W74-02582 7B

GEOLOGICAL SURVEY, MENLO PARK, CALIF.
Bolinas Lagoon, Marin County, California, Summary of Sedimentation and Hydrology, 1967-69,
W74-02296 2L

GEOLOGICAL SURVEY, PHOENIX, ARIZ. WATER RESOURCES DIV.
Monitoring of Streamflow in the Verde River by ERTS-1 Data Collection System (DCS),
W74-02594 7B

GEOLOGICAL SURVEY, RESTON, VA. EROS PROGRAM OFFICE.
Lineaments in Coastal Plain Sediments as Seen in ERTS Imagery,
W74-02566 7B

GEOLOGICAL SURVEY, TACOMA, WASH.
The Hydrology of Ten Streams in Western Washington as Related to the Propagation of Several Pacific Salmon Species,
W74-02297 8I

Evaluation of ERTS Imagery for Mapping and Detection of Changes of Snowcover on Land and on Glaciers,
W74-02604 7B

Water Resources of the Skokomish Indian Reservation, Washington,
W74-02623 2G

GEOLOGICAL SURVEY, TALLAHASSEE, FLA.
Nitrogen, Phosphorus, and Trace Elements in Florida Surface Waters, 1970-71,
W74-02476 5A

Summary of Hydrologic Conditions in Collier County, Florida, 1972,
W74-02622 2A

Hydrogeologic Aspects of a Proposed Sanitary Landfill Near Old Tampa Bay, Florida,
W74-02628 5E

Basic Water-Quality Data for Pollution Abatement Plan, Tampa Bay Area, Florida,
W74-02629 5B

GEOLOGICAL SURVEY, TUCSON, ARIZ.
Use of the Sri Electronic Satellite Image Analysis Console for Mapping Southern Arizona Plant Communities from ERTS-1 Imagery,
W74-02593 7B

GEOLOGICAL SURVEY, UNIVERSITY, ALA.
Aerial Remote Sensing of Carbonate Terranes in Shelby County, Alabama,
W74-02467 7B

GEOLOGICAL SURVEY, WASHINGTON, D.C.
Water Resources of Lee County, Mississippi,
W74-02340 4B

A Pneumatic Sample Changer for Gamma-Ray Spectroscopy,
W74-02407 7B

Shallow Ground Water in the Zamin Dawar Area, Helmand Province, Afghanistan,
W74-02472 4B

Flood of June 1972 at Corning, New York,
W74-02479 7C

Hydrology and Water Resources of the Neponset and Weymouth River Basins, Massachusetts,
W74-02480 7C

ERTS-1 Image Contributes to Understanding of Geologic Structures Related to Managua Earthquake, 1972,
W74-02561 7B

Hydrogeology of Closed Basins and Deserts of South America, ERTS-1 Interpretations,
W74-02588 7B

Floods at Martinsburg and Vicinity, West Virginia,
W74-02615 2E

Water Resources of the Big Sioux River Valley Near Sioux Falls, South Dakota,
W74-02619 2E

GEOLOGICAL SURVEY, WASHINGTON, D.C. WATER RESOURCES DIV.
Selected References, Ground-Water Contamination, The United States of America and Puerto Rico.
W74-02482 5B

GEORGIA EXPERIMENT STATION, EXPERIMENT.
Characterization of Waste Effluents from a Commercial Pimento Canning Operation,
W74-02379 5A

GEORGIA UNIV., ATHENS. DEPT. OF AGRONOMY.
Soil Pollution from Cattle Feedlots in Georgia,
W74-02210 5B

GEORGIA UNIV., ATHENS. INST. OF NATURAL RESOURCES.
The Ex Post Measurement of Benefits and Costs in Small Watershed Projects,
W74-02212 6B

GOSUDARSTVENNYI GIDROLOGICHESKII INSTITUT, LENINGRAD (USSR).
Water-Balance Method and Its Practical Importance, (Metod vodnogo balansa i yego prakticheskoye znacheniye),
W74-02308 2A

GOTEBORG UNIV. (SWEDEN). DEPT. OF ANALYTICAL CHEMISTRY.
Extraction of Boric Acid with Aliphatic 1,3-Diols and Other Chelating Agents,
W74-02368 5A

GREEN BAY PACKAGING INC., WIS.
Process Water Reuse and Upset Control Modifications at an Integrated NSSC Mill,
W74-02283 5D

GUELPH UNIV. (ONTARIO).
Studies in the Lake Ontario Basin Using ERTS-1 and High Altitude Data,
W74-02599 7B

HAWAII UNIV., HONOLULU. DEPT. OF CHEMISTRY.
Chemistry of Marine Natural Products,
W74-02189 5B

HAWAII UNIV., HONOLULU. WATER RESOURCES RESEARCH CENTER.
Water Recycling of Sewage Effluent by Irrigation: A Field Study on Oahu,
W74-02631 2B

HIMSLEY ENGINEERING LTD., TORONTO (ONTARIO).
Sodium Recovery from a Pulp Mill Waste Effluent by Ion Exchange,
W74-02259 5D

HORNER AND SHIFRIN, INC., ST. LOUIS, MO.
City of Austin, Texas, Study of Wastewater Collection System: Phase I.
W74-02330 5D

HUDGINS, THOMPSON, BALL AND ASSOCIATES, INC., LUBBOCK, TEX.
Metropolitan Water and Sewer Plan, Lubbock Metropolitan Council of Governments.
W74-02331 3D

HYDRO CHEMICAL AND MINERAL CORP., NEW YORK. (ASSIGNEE).
Internally Interconnected Multi-Stage Distillation System,
W74-02496 3A

IBAN UNIV. (NIGERIA). DEPT. OF BIOLOGY.
On the Origin of the Wet-Season Form of Zonocerus variegatus (L.) (Orth., Acrididae) In Southern Nigeria, with Some Biological Notes,
W74-02238 2I

IBM WATSON RESEARCH CENTER, YORKTOWN HEIGHTS, N.Y.
A Bayesian Decision Framework for Synthetic Hydrology,
W74-02438 6A

IDAHO UNIV., MOSCOW. DEPT. OF BACTERIOLOGY AND BIOCHEMISTRY.
The Influence of Organic Decomposition on Carbon Dioxide Hydrogen Sulfide, Dissolved Oxygen, and Algae Growth in the Dworshak Reservoir,
W74-02444 5C

IDAHO UNIV., MOSCOW. WATER RESOURCES RESEARCH INST.
Effect of Irrigation, Fertilization, and Other Cultural Practices on Water Quality,
W74-02321 5C

Systems Analysis of Irrigation Water Management in Eastern Idaho,
W74-02322 4B

Evaluation of the Regional Multipurpose Economic Benefits Resulting From a Water and Related Land Resource Development,
W74-02439 6B

ILLINOIS STATE ENVIRONMENTAL PROTECTION AGENCY, SPRINGFIELD. DIV. OF LAND POLLUTION CONTROL.
Evaluation of Nitrate Content of Ground Water in Hall County, Nebraska,
W74-02465 5B

ILLINOIS STATE ENVIRONMENTAL PROTECTION AGENCY, SPRINGFIELD. DIV. OF PUBLIC WATER SUPPLIES.
Public Water Supplies--Chlorination.
W74-02538 5G

Public Water Supplies.
W74-02539 5G

ILLINOIS STATE WATER SURVEY, URBANA.
A Technique for Evaluating Algal Growth Potential in Illinois Surface Waters,
W74-02342 5C

Water Quality Characteristics of Storm Sewer Discharges and Combined Sewer Overflows,
W74-02345 5B

ILLINOIS UNIV., URBANA.
Two Environmental Analyses Involving Agriculture,
W74-02166 5B

ILLINOIS UNIV., URBANA. DEPT. OF CIVIL ENGINEERING.
Field Tests on Transverse Mixing in Rivers,
W74-02318 5B

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). APPLIED GEOCHEMISTRY GROUP.
The Distribution of Trace Metals and Fauna in the Firth of Clyde in Relation to the Disposal of Sewage Sludge,
W74-02420 5B

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF CHEMISTRY.
Atomic Absorption and Fluorescence Spectrometry with a Carbon Filament Atom Reservoir. Part XIV. The Determination of Vanadium in Fuel Oils,
W74-02400 5A

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF METALLURGY.
Analysis by Means of Gas Bubble Electrification,
W74-02406 2K

INDIAN INST. OF TECH., KANPUR. DEPT. OF CIVIL ENGINEERING.
Studies on Seepage from Canals with Partial Lining,
W74-02319 4A

INSTITUT FUER SPEKTROCHEMIE UND ANGEWANDTE SPEKTROSKOPIE, DORTMUND (WEST GERMANY).
Application of Activated Carbon for the Enrichment of Trace Elements and Their Determination by Atomic Absorption Spectrometry, (Uber die Verwendung von Aktivkohle zur Anreicherung von Spurenelementen mit nachfolgender Bestim mung durch Atomabsorptions-Spektrometrie,
W74-02433 5A

INSTITUT PRIKLADNOI GEOFIZIKI, MOSCOW (USSR).
An Airborne Gamma Survey of Moisture Content in the Surface Detention Layer, (Samoletnaya gamma-s'yemka zapasov vlagi v sloye poverkhnostnogo zaderzhaniya),
W74-02307 2G

INSTITUT TROPICAL SUISSE, BASEL.
Attempt at Mollusk Control by Increasing the Planktonic Biomass and by Molluscicidal Treatment: The Urea-N-Tritylmorpholine Association (In French),
W74-02226 5C

INSTITUT ZA NUKLEARNE NAUKE BORIS KILDRIC, BELGRADE (YUGOSLAVIA).
Complex Behaviour of Cobalt in the Danube River,
W74-02373 5B

INSTITUTE OF ENVIRONMENTAL RESEARCH, GRAZ (AUSTRIA).
Comments on the Paper by G. W. Kwant 'Sixteen Years of Water Fluoridation in The Netherlands and Its Influence on Dental Decay,'
W74-02230 5F

INSTITUTE OF INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES, BRATISLAVA (CZECHOSLOVAKIA).
Isolation and Cleanup of Organophosphorus Insecticides and Their Oxones from Animal Tissues,
W74-02403 5A

INSTITUTE OF NUCLEAR SCIENCES, LOWER HUTT (NEW ZEALAND).
Accumulation of Fossil CO2 in the Atmosphere and the Sea,
W74-02375 5C

INSTITUTE OF PAPER CHEMISTRY, APPLETON, WIS.
Treatment of Sulfite Evaporator Condensates for Recovery of Volatile Components,
W74-02281 5D

Improving Reverse Osmosis Performance with Dynamically Formed Wood Chemical Membranes,
W74-02286 5D

INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA (AUSTRIA).
Calculation of Dose Conversion Factors for 60Co Gamma Radiation in Water, (In German),
W74-02198 5B

INTERNATIONAL PAPER CO., MOBILE ALA.
Color Removal from Kraft Pulp Mill Effluents by Massive Lime Treatment,
W74-02284 5D

IOWA STATE GEOLOGICAL SURVEY, IOWA CITY. REMOTE SENSING LAB.
Application of ERTS-1 Imagery to Flood Inundation Mapping,
W74-02591 7B

IOWA STATE UNIV., AMES.
Development of Models for Analyzing Water Resources Development and Use Within a Regional Framework,
W74-02455 6A

IOWA STATE WATER RESOURCES RESEARCH INST., AMES.
Ground Water Seepage Patterns to Wells for Unconfined Flow--Phase II,
W74-02206 2F

IOWA UNIV., IOWA CITY.
Some Chemical and Biological Characteristics of the Mississippi River Bordering Iowa,
W74-02363 5B

IOWA UNIV., IOWA CITY. DEPT. OF GEOLOGY.
Structural Interpretations Based on ERTS-1 Imagery, Bighorn Region, Wyoming-Montana,
W74-02568 7B

JAPAN METEOROLOGICAL AGENCY, TOKYO.
Application of ERTS Data to the Detection of Thin Cirrus and Clear Air Turbulence,
W74-02585 7B

JAPANESE SOCIETY OF LIMNOLOGY, OTSU (JAPAN).
On the Characteristics of Salt Intrusion in the Kitakami River, Miyagi Prefecture (In Japanese),
W74-02541 5B

JOHANNESBURG CONSOLIDATED INVESTMENT CO. LTD., RANDFONTEIN (SOUTH AFRICA). GEOLOGICAL RESEARCH DEPT.
ERTS-1 Imagery as an Aid to the Definition of the Geotectonic Domains of the Southern African Crystalline Shield,
W74-02563 7B

JOHN HOPKINS UNIV., WASHINGTON, D.C. SCHOOL OF ADVANCED INTERNATIONAL STUDIES.
New Concepts in the Law of the Sea,
W74-02497 6E

KANSAS STATE UNIV., MANHATTAN. DEPT. OF INDUSTRIAL ENGINEERING.
Optimization of Industrial Systems with the Separable Programming and the Generalized Reduced Gradient Methods,
W74-02213 5G

KANSAS WATER RESOURCES RESEARCH INST., MANHATTAN.
Interbasin Transfer or Migration: An Economic Analysis of Two Responses to Ground Water Depletion,
W74-02323 4B

KAZAN STATE UNIV. (USSR).
The Age Group Distribution of Pelobates fuscus (Laur.) at the Kuibyshev Reservoir Shores (In Russian),
W74-02641 2H

KENTUCKY DEPT. OF NATURAL RESOURCES, FRANKFORT. DIV. OF WATER.
Calibrating A Water Yield Model for Small Ungaged Watersheds,
W74-02172 2A

KENTUCKY UNIV., LEXINGTON. DEPT. OF CHEMICAL ENGINEERING.
Experimental Study of the Phase-Selective Anodic Stripping Analysis of Micromolar Cadmium (II) at the Micrometer Hanging Mercury Drop Electrode in 0.1 m Potassium Chloride,
W74-02415 2K

KIMBERLY-CLARK CORP., NEENAH, WIS.
Advanced Practical Water Recycle in Tissue Manufacture,
W74-02279 5D

KOBE UNIV. (JAPAN). DEPT. OF BIOLOGY.
On Mallomonas lelymeme Harris Et Bradley (Chrysophyceae), (In Japanese),
W74-02550 2H

KOMENSKEHO UNIVERSITA, BRATISLAVA (CZECHOSLOVAKIA). DEPT. OF GEOBOTANY.
Influence of the Soil Water Level on Microbial Processes of Pasture and Forest Communities,
W74-02194 2G

KOMENSKEHO UNIVERSITA, BRATISLAVA (CZECHOSLOVAKIA). DEPT. OF MICROBIOLOGY.
Influence of Soil Structure and Moisture on Nitrification,
W74-02192 2G

Influence of Herbicides on Microbiological Conditions,
W74-02548 5B

KUMAMOTO UNIV. (JAPAN). FACULTY OF EDUCATION.
Study on the Plasmolysis Time in Epidermal Cells from Leaves of Saxifraga stolonifera Meerb (In Japanese),
W74-02542 2I

KYOTO GAKUEN UNIV. (JAPAN).
Polluted and Turbid Water Masses in Osaka Bay and Its Vicinity Revealed with ERTS-A Imageries,
W74-02586 7B

KYOTO UNIV. (JAPAN). DEPT. OF CHEMISTRY.
A High-Speed Liquid Chromatograph with a Flow-Spectrofluorimetric Detector and the Ultramicro-Determination of Aromatic Compounds,
W74-02397 5A

L.L.R.M. MEDICAL COLL., MEERUT (INDIA). DEPT. OF PATHOLOGY.
Relation of Mineral and Hormone Metabolism to Intake of Water with a High Natural Content of Fluoride,
W74-02235 5C

LABORATORIUM VOOR ANALYTISCHE SCHEIKUNKE, AMSTERDAM (NETHERLANDS).
Amperometric Titration of Mercury (II) with EDTA, DTPA and Trien in the PPM-Range,
W74-02405 5A

LAJOS KOSSUTH UNIV., DEBRECEN (HUNGARY). ZOOLOGICAL INST.
Debrecen Area Inland Waters: Hydrobiological Approach: Influence on Water Quality of Main Eastern Irrigation Canal with Reference to Debrecen's Drinking and Industrial Water Supply,
W74-02543 5C

LANDWIRTSCHAFTLICHE FORSCHUNGSANSTALT, BUENTEHOF (WEST GERMANY).
The Effect of Soil Moisture Upon the Availability of Potassium and its Influence on the Growth of Young Maize Plants (Zea mays L.),
W74-02554 3F

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS.
Current Status of the Environmental and Human Safety Aspects of Nitrilotriacetic Acid (NTA),
W74-02394 5B

LIVERPOOL UNIV. (ENGLAND). DEPT. OF OCEANOGRAPHY.
Dispersion in Flow from a Continuous Source at Sea,
W74-02163 5B

LOCKHEED AIRCRAFT SERVICE CO., ONTARIO, CALIF.
Electrochemical Flotation Concept for Removing Oil from Water,
W74-02634 5D

LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Another Rio Grande for New Mexico,
W74-02461 3A

MAINZ UNIV. (WEST GERMANY). INSTITUT FUER ANORGANISCHE CHEMIE UND KERNCHEMIE.
Separation and Gas-Chromatographic Determination of Traces of Fluoride, (Abtrennung und gas-chromatographische Bestimmung von Fluoridspuren),
W74-02431 5A

MARYLAND UNIV., SOLOMONS. NATURAL RESOURCES INST.
Iron, Zinc, Magnesium, and Copper Concentrations in Body Meat of the Blue Crab, Callinectes sapidus,
W74-02409 5A

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. RALPH M. PARSONS LAB. FOR WATER RESOURCES AND HYDRODYNAMICS.
Damping of Water Waves Over Porous Bed,
W74-02315 2E

MASSACHUSETTS UNIV., AMHERST. COASTAL RESEARCH CENTER.
Detailed Analysis of Short-Term Variations in Beach Morphology (And Concurrent Dynamic Processes) for Summer and Winter Periods, 1971-1972, Plum Island, Massachusetts,
W74-02649 2E

MASSACHUSETTS UNIV., AMHERST. DEPT. OF FORESTRY AND WILDLIFE MANAGEMENT.
A Guide to Important Characteristics and Values of Freshwater Wetlands in the Northeast.
W74-02324 4B

MAYES, SUDDERTH AND ETHEREDGE, INC., ATLANTA, GA.
A Water and Sewer Plan: Greene County, Georgia.
W74-02334 5D

A Water and Sewer Plan: Morgan County, Georgia.
W74-02335 5D

A Water and Sewer Plan: Madison County, Georgia.
W74-02336 5D

A Water and Sewer Plan: Walton County, Georgia.
W74-02337 5D

Northeast Georgia Area Water and Sewer Systems Plan and Capital Improvement Program.
W74-02339 3D

MIAMI UNIV., OXFORD, OHIO. DEPT. OF GEOLOGY.
Strontium, Calcium and the Isotopic Composition of Strontium in Underground Waters from the Scioto River Basin, Ohio,
W74-02218 2F

MIAMI UNIV., OXFORD, OHIO. HUGHES LABS.
Photolysis of Parathion (O,O-Diethyl-O- (4-Nitrophenyl) Thiophosphate). New Products,
W74-02380 5B

MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF PARK AND RECREATION RESOURCES.
User Related Study of Three Michigan Rivers,
W74-02202 6B

Economic Evaluation of the Sport Fishery of the Au Sable River, Michigan,
W74-02203 6B

The Demand for and Value of the Sport Fishery on the Au Sable, Jordan, and Red Cedar Rivers,
W74-02204 6B

MICHIGAN STATE UNIV., EAST LANSING. INST. OF WATER RESEARCH.
An Ecological Evaluation of Stream Eutrophication,
W74-02201 5C

MICHIGAN WATER RESOURCES COMMISSION, LANSING.
Michigan State Water Pollution Control Plan.
W74-02511 5G

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, LOWESTOFT (ENGLAND). FISHERIES RADIOBIOLOGICAL LAB.
Distribution of Caesium-137 in British Coastal Waters,
W74-02365 5B

MINISTRY OF WORKS, NELSON (NEW ZEALAND). WATER AND SOIL DIV.
Mapping Average Annual Surface Water Resources of the Hydrological Regions of Nelson, New Zealand,
W74-02290 2E

MINISTRY OF WORKS, WELLINGTON (NEW ZEALAND). WATER AND SOIL DIV.
The Water Balance of New Zealand,
W74-02291 2A

MISSISSIPPI MARINE CONSERVATION COMMISSION, BILOXI.
Seasonal and Areal Distribution and Abundance of the Copepoda in a Mississippi Estuarine System,
W74-02637 2L

Development of a Mathematical Model to Predict the Occurrence of Cynoscion arenarius in Mississippi Estuaries,
W74-02640 2L

MISSOULA. DEPT. OF ZOOLOGY.
Determination of the Microlevel Temperatures During Lake Cooling, Ice Formation, Icemelt and the Break-up of the Ice cover of a Mountain Lake, Holland Lake, Missoula County,
W74-02447 2C

MISSOURI UNIV., KANSAS CITY. DEPT. OF PHYSICS.
Optical Constants of Water in the 200-nm to 200-Micrometer Wavelength Region,
W74-02167 2K

MISSOURI UNIV., ROLLA. GRADUATE CENTER FOR MATERIALS RESEARCH.
Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Wet Carbon,
W74-02418 5A

Organic Desorption from Carbon-II. The Effect of Solvent in the Desorption of Phenol from Dry Carbon,
W74-02419 5A

MISSOURI WATER RESOURCES RESEARCH CENTER, ROLLA.
Heavy Metals in the Main Streams of the James River Basin, Missouri,
W74-02445 5A

MONTANA STATE UNIV., BOZEMAN. DEPT. OF CHEMISTRY.
Voltammetric Identification of Organochlorine Insecticides, Polychlorinated Biphenyls, Polychlorinated Naphthalenes and Polychlorinated Benzenes,
W74-02389 5A

MONTANA STATE UNIV., BOZEMAN. DEPT. OF MICROBIOLOGY.
Microbial ND Chemical Studies in a Watershed used for Municipal Supply and Waste Disposal,
W74-02449 5C

MONTANA STATE UNIV., BOZEMAN. WATER RESOURCES RESEARCH CENTER.
Development of an 'Operations' Model for Montana's Water Resources: Middle Creek Reservoir Operation,
W74-02214 4A

MONTANA UNIV., MISSOULA.
Floodplain Mapping and Planning for the 50 and 100 Year Interval Flood Zones of the Bitterroot Valley, Montana,
W74-02215 4A

Applicability of ERTS-1 to Lineament and Photogeologic Mapping in Montana--Preliminary Report,
W74-02569 7B

MONTANA UNIV., MISSOULA. DEPT. OF GEOLOGY.
The Role of Deformation in Changing the Reservoir Properties of Aquifers,
W74-02446 2F

MONTANA UNIV., MISSOULA. DEPT. OF ZOOLOGY.
Description, Distribution, and Ecology of the Rotifer and Crustacean Plankton Communities, Flathead Lake, Montana,
W74-02448 2H

MOSCOW STATE UNIV. (USSR).
Effect of Excess Soil Moisture on Yield and Biochemical Processes in Spring Wheat at Various Stages of Its Development (In Russian),
W74-02325 3F

MUNICIPAL SANITARY-EPIDEMIOLOGICAL CENTER, VOROSHILOVGRAD (USSR).
Effect of a Cinder Settling Tank of a Thermal Electric Power Plant on the Quality of Subsurface Waters, (In Russian),
W74-02231 5B

NAGOYA UNIV. (JAPAN). DEPT. OF SYNTHETIC CHEMISTRY.
Determination of Trace Amounts of Chromium by Atomic Absorption Spectrometry with a Tantalum Filament Atomizer,
W74-02367 2K

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, CLEVELAND, OHIO. LEWIS RESEARCH CENTER.
Analysis of Internal Flow Characteristics of a Smooth-Disk Water-Brake Dynamometer,
W74-02475 8C

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. ANALYTICAL CHEMISTRY DIV.
High Precision Sampling for Chromatographic Separations,
W74-02414 2K

NATIONAL INST. OF RADIOLOGICAL SCIENCES, CHIBA (JAPAN).
Determination of Trace Fluorine in Biological Materials by Photonuclear Activation Analysis,
W74-02361 5A

NATIONAL INST. OF RADIOLOGICAL SCIENCES, CHIBA (JAPAN). DEPT. OF ENVIRONMENTAL CONTAMINATION.
Accumulation of Strontium and Calcium in Freshwater Fishes of Japan,
W74-02197 5C

NATIONAL MARINE FISHERIES SERVICE, SEATTLE, WASH. PACIFIC FISHERY PRODUCTS TECHNOLOGY CENTER.
The Use and Effect of Mixed Standards on the Quantitation of Polychlorinated Biphenyls,
W74-02393 5A

NATIONAL OCEANOGRAPHIC INSTRUMENTATION CENTER, WASHINGTON, D.C.
Salinity Corrections for Dissolved Oxygen Measurements,
W74-02424 5A

NAVAL BIOMEDICAL RESEARCH LAB., OAKLAND, CALIF.
Fate of Petroleum Hydrocarbons In Beach Sand,
W74-02473 5B

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Investigation of Sorbents for Removing Oil Spills from Waters,
W74-02636 5G

NAVAL WEAPONS CENTER, CHINA LAKE, CALIF. RESEARCH DEPT.
Hydrocarbon-Oxidizing Bacteria and Their Possible Use as Controlling Agents of Oil Pollution in the Ocean,
W74-02618 5G

NEBRASKA UNIV., LINCOLN. DEPT. OF AGRONOMY.
A Study of Factors Influencing the Nitrogen and Phosphorus Contents of Nebraska Waters,
W74-02151 5B

NEUCHATEL UNIV. (SWITZERLAND). CENTRE DE HYDROGEOLOGIE.
Salt, a Little-Known Aggressor in Our Environment, (In French),
W74-02199 5B

NEW BRUNSWICK UNIV., FREDERICTON.
Evaluation of Soil Moisture Regime in a Watershed,
W74-02355 2G

NEW MEXICO INST. OF MINING AND TECHNOLOGY, SOCORRO. DEPT. OF BIOCHEMISTRY.
Uptake of Mercury by Fish in Natural and Artificial Systems,
W74-02460 5B

NEW MEXICO INST. OF MINING AND TECHNOLOGY, SOCORRO. DEPT. OF GEOSCIENCE.
A Conjunctive use Surface Water-Ground Water Simulator,
W74-02452 2F

NEW MEXICO STATE UNIV., UNIVERSITY PARK. DEPT. OF HORTICULTURE.
A Study of Water Used on Urban Landscapes,
W74-02459 6B

NEW MEXICO UNIV., ALBUQUERQUE. BUREAU OF BUSINESS RESEARCH.
Population Projectsions for the New Mexico State Water Plan,
W74-02458 6B

NEW SOUTH WALES DEPT. OF MINES, SYDNEY (AUSTRALIA). CHEMICAL LAB.
Occurrence of Silica in the Natural Waters of the Huntley-Robertson District, Southern New South Wales,
W74-02555 2K

NEW SOUTH WALES UNIV., KENSINGTON (AUSTRALIA). SCHOOL OF GEOGRAPHY.
Slope Aspect and Tunnel Erosion in the Loess of Banks Peninsula, New Zealand,
W74-02288 2J

NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION, ALBANY. ENVIRONMENTAL QUALITY RESEARCH AND DEVELOPMENT UNIT.
Survey of Methods of Treating Wine and Grape Waste Water,
W74-02329 5D

NEW YORK UNIV., N.Y. COURANT INST. OF MATHEMATICAL SCIENCES.
Two-Dimensional Waves Generated by a Surface Pressure Disturbance Over a Sloping Beach,
W74-02187 2E

NIJO JUNIOR HIGH SCHOOL, KYOTO (JAPAN).
On the Relation Between the Occurrence of Desmids and the Salinity in the Hokuriku District of Japan, (In Japanese).
W74-02191 5B

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF ENTOMOLOGY.
Insect Pest Management in Coastal and Estuarine Habitats,
W74-02643 5G

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF GEOSCIENCES.
Statistical Analysis of North Carolina Precipitation Data,
W74-02632 2B

NORTHWESTERN UNIV., EVANSTON, ILL. TECHNOLOGICAL INST.
Computer Simulation of Storm Water Runoff,
W74-02310 2E

NOVA SCOTIA TECHNICAL COLL., HALIFAX. DEPT. OF CHEMICAL ENGINEERING.
The Formation of Water-In-Oil Emulsions Subsequent to an Oil Spill,
W74-02377 5B

OAK RIDGE NATIONAL LAB., TENN.
Hyperfiltration (Reverse Osmosis) of Kraft Pulp Mill and Bleach Plant Wastes,
W74-02285 5D

Chlorination Effects on Organic Constituents in Effluents from Domestic Sanitary Sewage Treatment Plants,
W74-02416 5C

OFFICE OF THE CHIEF OF ENGINEERS (ARMY), WASHINGTON, D.C.
Feasibility Study of the Sand Sinking Method of Combatting a Major Oil Spill in the Ocean Environment,
W74-02635 5G

OHIO STATE UNIV., COLUMBUS. COLL. OF MEDICINE.
Determination of Zinc by Flameless Atomic Absorption Spectrophotometry,
W74-02399 5A

OHIO STATE UNIV., COLUMBUS. WATER RESOURCES CENTER.
Flow Analysis of Hydraulic Connectors in Artificial Recharge Systems, A Model Study,
W74-02219 4B

OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF AGRONOMY.
Experimental and Predicted Movement of Three Herbicides in a Water-Saturated Soil,
W74-02156 5B

OLD DOMINION UNIV., NORFOLK, VA. DEPT. OF GEOPHYSICAL SCIENCES.
Remote Detection of Aerosol Pollution by ERTS,
W74-02575 7B

ONTARIO RESEARCH FOUNDATION, SHERIDAN PARK. PESTICIDE AND TRACE ANALYTICAL LAB.
Polychlorinated Terphenyls in Paperboard Samples,
W74-02392 5A

OREGON STATE UNIV., CORVALLIS.
Laboratory and Controlled Experimental Stream Studies of the Effects of Kraft Effluents on Growth and Production of Salmonid Fish,
W74-02277 5C

OREGON STATE UNIV., CORVALLIS. DEPT. OF AGRICULTURAL CHEMISTRY.
Occurrence of Hexachlorophene and Pentachlorophenol in Sewage and Water,
W74-02426 5A

OREGON STATE UNIV., CORVALLIS. DEPT. OF CIVIL ENGINEERING.
Hydrologic Evaluations in Bridge Pier Scour Design,
W74-02309 8B

OREGON STATE UNIV., CORVALLIS. DEPT. OF GEOGRAPHY.
The Problems and Issues of Implementing the Federal Water Project Recreation Act in the Pacific Northwest,
W74-02453 6C

OREGON STATE UNIV., CORVALLIS. SCHOOL OF OCEANOGRAPHY.
An Automated Analysis for Urea in Seawater,
W74-02421 5A

OREGON UNIV., EUGENE. SCHOOL OF LAW.
Challenges to Federalism: State Legislation Concerning Marine Oil Pollution,
W74-02502 5G

ORLANDO LABS., INC., FLA.
Comparing the Quality of Our Waters,
W74-02428 5A

OTAGO UNIV., DUNEDIN (NEW ZEALAND). DEPT. OF GEOGRAPHY.
Comparison of Raingauge Evaporation Suppressants,
W74-02289 2D

OUACHITA BAPTIST UNIV., ARKADELPHIA, ARK.
Growth Rates of Lepomis macrochirus (Centrarchidae) in Three Areas of Lake Texoma,
W74-02422 2H

PACIFIC ENGINEERING AND PRODUCTION CO. OF NEVADA, HENDERSON. (ASSIGNEE).
Method and Apparatus for Electrolytic Treatment of Sewage,
W74-02486 5D

PAHLAVI UNIV., SHIRAZ (IRAN). DEPT. OF ENGINEERING.
Flow in Open Channels With Smooth Curved Boundaries,
W74-02312 8B

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF CHEMISTRY.
Interpretation of Infrared Specta Using Pattern Recognition Techniques,
W74-02376 2K

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. OFFICE FOR REMOTE SENSING OF EARTH RESOURCES.
The Use of ERTS-1 MSS Data for Mapping Strip Mines and Acid Mine Drainage in Pennsylvania,
W74-02573 7B

PERMSKII POLITEKHNICHESKII INSTITUT (USSR). DEPT. OF SANITARY TECHNOLOGY.
Using the Adsorption Method on Activated Charcoal with Chloroform Extraction (CCE) for Evaluating Water Pollution by Organic Substances, (In Russian),
W74-02232 5B

PERMUTIT CO. LTD., LONDON (ENGLAND).
Ion Exchange and Allied Processes in Water Recovery,
W74-02268 5D

POLISH ACADEMY OF SCIENCES, KRAKOW. ZAKLAD BIOLOGII WOD.
The Spreading of Heavy Metals in Flowing Waters in the Region of Occurrence of Natural Deposits and of the Zinc and Lead Industry. (Rozprzestrzenienie metali ciezkich w wodach plynacych w rejonie wystepowania naturalnych zloz oraz przemyslu cynku i olowiu),
W74-02435 5B

POLISH ACADEMY OF SCIENCES, WARSAW. INST. OF ECOLOGY.
The Effect of Organic Substrates on the Abundance of Bacteria in the Water of 5 Masurian Lakes,
W74-02556 5C

The Effect of Temperature on the Generation Time of a Bacterial Community in Lake Water,
W74-02557 5B

POLYTECHNIC INST. OF BROOKLYN, N.Y.
Power, Fresh Water, and Food From Cold, Deep Sea Water,
W74-02254 3B

PUBLISHERS PAPER CO., OREGON CITY, OREG.
Water Quality Control Program at Publishers Paper Co.,
W74-02275 5D

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF ENTOMOLOGY.
Enhancement of the Sensitivity and Selectivity of the Coulson Electrolytic Conductivity Detector to Chlorinated Hydrocarbon Pesticides,
W74-02413 5A

PURDUE UNIV., LAFAYETTE, IND. LAB. FOR APPLICATIONS OF REMOTE SENSING.
Recognition of Surface Lithologic and Topographic Patterns in Southwest Colorado with ADP Techniques,
W74-02562 7B

QUEEN'S UNIV., KINGSTON (ONTARIO). COASTAL ENGINEERING RESEARCH LAB.
A New Oscillating Water Tunnel,
W74-02160 2J

A Shear Plate for Use in Oscillatory Flow,
W74-02161 2E

QUEEN'S UNIV., KINGSTON (ONTARIO). DEPT. OF CIVIL ENGINEERING.
The Turbulent Temperature Mixing Layer,
W74-02162 8B

RESEARCH INST. FOR WATER RESOURCES DEVELOPMENT, BUDAPEST (HUNGARY).
The Balance of Surface Water Resources in the Lower Mesopotamian Valley,
W74-02350 6B

RHODE ISLAND UNIV., KINGSTON.
Development of the Freedom of Scientific Research Issue of the Third Law of the Sea Conference,
W74-02501 6E

RHODE ISLAND UNIV., KINGSTON. COASTAL RESOURCES CENTER.
Approaches to State Coastal Management,
W74-02185 2L

RHODE ISLAND UNIV., KINGSTON. LAW OF THE SEA INST.
Indices of National Interest in the Oceans,
W74-02499 6E

RHODESIA UNIV., SAILSBURY. DEPT. OF AGRICULTURE.
A Self-Draining Subsurface Rainfall Conservation System: Its Effect on the Soil Water Status and Productivity of Coastal Plains Sands,
W74-02193 2G

ROSTOCK UNIV. (EAST GERMANY). INSTITUT FUER HYGIENE.
Comparative Productivity Studies of Three Mecklenburg Lakes (Lake Kummerow, Lake Teterow and Lake Malchin), (In German),
W74-02558 2H

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF ENVIRONMENTAL SCIENCES.
A Study of the Factors Determining the Oxygen Uptake of Benthal Stream Deposits,
W74-02451 5C

SAGA UNIV. (JAPAN). LAB. OF SHORE RECLAMATION.
On the Variation of Salinity Distribution in a Reservoir, Situated in Reclaimed Land, (Japanese),
W74-02246 2H

SANITARNO-GIGIENICHESKII MEDITSINSKII INSTITUT, LENINGRAD (USSR).
Effect of A Cement Anticorrosion Coating on the Quality of Drinking Water, (In Russian),
W74-02233 5B

SCRIPPS INSTITUTION OF OCEANOGRAPHY, SAN DIEGO, CALIF.
Scientific Aspects of Maritime Sovereignty Claims,
W74-02498 6E

SLOVENSKE POLNOHOSPODARSKE AKADEMIE, BRATISLAVA (CZECHOSLOVAKIA). LABORATORIUM RYBARSTVA.
Some Further Results of the Zooplankton Studies in the Czechslovak-Hungarian Stretch of the Danube,
W74-02545 2I

SOCIETA ITALIANA RESINE S.P.A., MILAN (ITALY). (ASSIGNEE).
Multi-Stage Flash Evaporator,
W74-02490 3A

SOIL AND IRRIGATION RESEARCH INST., PRETORIA (SOUTH AFRICA).
Significance of pH and Chloride Concentration on Behavior of Heavy Metal Pollutants: Mercury (II), Cadmium (II), Zinc (II), and Lead (II),
W74-02155 5B

SOIL CONSERVATION SERVICE, ALBANY, N.Y.
Urban Storm Drainage Activities in New York,
W74-02171 4A

SOIL CONSERVATION SERVICE, GULFPORT, MISS.
General Soils Study: Pearl River, Hancock, Harrison Counties, Mississippi.
W74-02333 2G

SOIL CONSERVATION SERVICE, ORONO, MAINE
Ogunquit Sand Dune Land Stabilization Measure, York County in Maine, Threshold to Maine Resource Conservation and Development Project (Final Environmental Statement).
W74-02504 4A

SOIL CONSERVATION SERVICE, PORTLAND, OREG.
Hydrologic and Watershed Modeling for Watershed Planning,
W74-02224 4D

SOIL CONSERVATION SERVICE, SAN MARCOS, TEX.
Severe Floods at New Braunfels, Texas, May 1972,
W74-02173 2E

SOUTH AFRICAN PULP AND PAPER INDUSTRIES LTD., SPRINGS. ENSTRA MILL.
Advanced Treatment of Purified Sewage for Production of High-Brightness Pulp and Paper,
W74-02280 5D

SOUTH DAKOTA STATE UNIV., BROOKINGS. DEPT. OF SOILS.
Plant Nutrient Concentrations in Runoff from Fertilized Cultivated Erosion Plots and Prairie in Eastern South Dakota,
W74-02154 5B

SOUTHAMPTON UNIV. (ENGLAND). DEPT. OF OCEANOGRAPHY.
Seasonal Changes in the Organic Forms of Carbon, Nitrogen and Phosphorus in Sea Water at El in the English Channel During 1968,
W74-02369 5B

SOUTHERN OREGON COLL., ASHLAND. DEPT. OF GEOGRAPHY.
Application and Consequences of Precipitation Observations in the Republic of Sudan in View of the Nomadic Life and Economy,
W74-02348 2B

SPECTRAL AFRICA (PTY) LTD., RANDFONTEIN (SOUTH AFRICA).
Monitoring Vegetation Cover on Mine Dumps with ERTS-1 Imagery: Some Initial Results,
W74-02574 7B

SYDNEY UNIV. (AUSTRALIA). SCHOOL OF BIOLOGICAL SCIENCES.
The Action of Abscisic Acid on Ion Uptake and Water Flow in Plant Roots,
W74-02260 3F

SYRACUSE UNIV. RESEARCH CORP., N.Y. LIFE SCIENCES DIV.
Persistence of Endothall in Aquatic Environment as Determined by Gas-Liquid Chromatography,
W74-02381 5B

TAHAL CONSULTING ENGINEERS LTD. (TEL AVIV, ISRAEL).
Use of Systems Approaches in Planning Israel's Water Resources Management,
W74-02352 6A

TASHKENT UNIV. (USSR).
Lake Sary-Chelek and its Zooplankton, (In Russian),
W74-02261 2H

Total Isotopic Composition and Hydrochemical Characteristics of Natural Waters in Northwestern and Northern Fergana (Summarnyy izotopnyy sostav i gidrokhimicheskiye osobennosti prirodnykh vod Severo-Zapadnoy i Severnoy Fergany),
W74-02608 2K

TAVDINSKII GIDROLIZNYI ZAVOD (USSR).
Experience with the Operation of Purification Equipment, (Opyt ekspluatatsii ochistnykh sooruzhenii),
W74-02272 5D

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, ATLANTA, GA.
(TAPPI) Environmental Conference, May 14-16, 1973.
W74-02273 5D

TECHNION-ISRAEL INST. OF TECH., HAIFA. SOILS AND FERTILIZERS LAB.
Minimizing Nitrate Seepage from the Hula Valley into Lake Kinneret (Sea of Galilee): 1. Enhancement of Nitrate Reduction by Sprinkling and Flooding,
W74-02153 5B

TECHNISCHE HOCHSCHULE, DARMSTADT (WEST GERMANY). EDUARD-ZINTL-INSTITUT.
Nuclear Magnetic Resonance Relaxation Titration,
W74-02402 2K

TECHNISCHE UNIVERSITAET, DARMSTADT (WEST GERMANY). WASSER- UND ABWASSERFORSCHUNGSSTELLE.
Waste Water Research for the Pulp and Paper Industry at the Darmstadt Technological Institute (Abwasserforschung fuer die Papier-und Zellstoffindustrie an der TH Darmstadt),
W74-02257 5D

TENNESSEE UNIV., KNOXVILLE. DEPT. OF AGRICULTURAL ENGINEERING.
The Effects on Runoff, Groundwater, and Land of Irrigating With Cattle Manure Slurries,
W74-02326 5D

TENNESSEE UNIV., KNOXVILLE. DEPT. OF CIVIL ENGINEERING.
Impact of Sewage Treatment Modifications on Water Quality of a Reservoir,
W74-02483 5D

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF RANGE SCIENCE.
Dissipation and Phytotoxicity of Dicamba Residues in Water,
W74-02370 5B

TEXAS INSTRUMENTS, INC., DALLAS.
Evaluation of Commercial Utility of ERTS-A Imagery in Structural Reconnaissance for Minerals and Petroleum,
W74-02567 7B

TEXAS TECH UNIV., LUBBOCK. DEPT. OF GEOSCIENCES.
Dynamics of Playa Lakes in the Texas High Plains,
W74-02598 7B

TEXAS UNIV., AUSTIN. DEPT. OF CHEMISTRY.
Hanging Mercury Drop Electrodeposition Technique for Carbon Filament Flameless Atomic Absorption Analysis. Application to the Determination of Copper in Sea Water,
W74-02411 2K

TEXAS WATER DEVELOPMENT BOARD, AUSTIN.
Report by the National Water Commission--A Review,
W74-02463 6B

TOBA MERCHANT MARINE COLL. (JAPAN).
Red Tide in Ise Bay,
W74-02587 7B

TOKYO UNIV. (JAPAN). INST. OF INDUSTRIAL SCIENCE.
Ion-Exchange Separations on Mixed Columns,
W74-02398 5A

A Study on the Erosion of Niigata Beach from ERTS-A Imagery,
W74-02584 7B

TOMBIGBEE RIVER VALLEY WATER MANAGEMENT DISTRICT, TUPELO, MISS.
Tombigbee River Valley Water Management District, Tenth Annual Report.
W74-02332 6B

TOMSK STATE UNIV. (USSR).
Probability Analysis in an Approximate Theory of Movement of Water Masses, (Veroyatnostnyy analiz v priblizhennoy teorii peremeshcheniya vodnykh mass),
W74-02305 2E

TOMSK STATE UNIV. (USSR). KAFEDRA POCHVOVEDENIYA I AGROKHIMII.
Moisture Regime of Southern Chernozem Within Shelterbelts, (Rezhim vlazhnosti yuzhnogo chernozema v sisteme lesnykh polos),
W74-02302 2G

TROPICAL BIOINDUSTRIES DEVELOPMENT CO., SOUTH MIAMI, FLA.
Applicability of the Interceptor Waterway Concept to the Rookery Bay Sanctuary,
W74-02205 4A

TUSKEGEE INST., ALA.
The Effects of Trace Metals on Ground Water Quality as Influenced by Soils Reflecting Differences in Organic Matter Content and Genetic Conditions,
W74-02211 5B

UHDE (FRIEDRICH) G.M.B.H., DORTMUND (WEST GERMANY).
Reduction of BOD and Phosphate by Chemical Precipitation. Utilisation of Sludge,
W74-02267 5D

UKRAINIAN RESEARCH INST. OF THE FISH INDUSTRY, KIEV (USSR).
The Quantity and Dimensions of Microorganisms in Bottom Sediments of Fish-Breeding Ponds (In Russian),
W74-02228 8I

UKRAINSKII NAUCHNO-ISSLEDOVATELSKII GIDROMETEOROLOGICHESKII INSTITUT, KIEV (USSR).
Storm Rainfall in the Carpathians in June 1969,
W74-02606 2B

Storm Rainfall in the Black Sea Region as a Factor in Soil Erosion,
W74-02607 2B

UKRAINSKII NAUCHNO-ISSLEDOVATELSKII GIDROMETEOROLOGIDHESKII INSTITUT, KIEV (USSR).
Thermal Regime of the Lower Reaches of the Danube River in Autumn and Winter,
W74-02605 2C

UNION CARBIDE CORP., NEW YORK. (ASSIGNEE).
Nitrification of BOD-Containing Water,
W74-02485 5D

UNION CARBIDE CORP., TARRYTOWN, N.Y.
A New Aquatic Insect Trap,
W74-02551 7B

UNIVERSITY COLL. OF ENGINEERING, HYDERABAD (INDIA). DEPT. OF CIVIL ENGINEERING.
Unsteady Drawdown at a Partially Penetrating Well in a Transversely Isotropic Artesian Aquifer,
W74-02466 4B

UNIVERSITY COLL. OF SWANSEA (WALES). DEPT. OF GEOLOGY AND OCEANOGRAPHY.
An Improved Bottom-Water Sampler,
W74-02410 7B

UPPER TAME MAIN DRAINAGE AUTHORITY, BIRMINGHAM (ENGLAND).
Printout Colorimeter for Autoanalysis of Water Pollution,
W74-02374 5A

USTREDNI USTAV GEOLOGICKY, BRNO (CZECHOSLAVAKIA).
Determination of the Mechanical Compatibility of Porous Rocks with Waste Water in its Subsurface Disposal,
W74-02165 5B

UTAH STATE UNIV., LOGAN. DEPT. OF CIVIL ENGINEERING.
Municipal Water Planning--Mixed Integer Approach,
W74-02223 3D

UTRECHT RIJKSUNIVERSITEIT (NETHERLANDS). MICROBIOLOGY LAB.
Sixteen Years of Water Fluoridation in the Netherlands and Its Influence on Dental Decay,
W74-02229 5F

VERMONT UNIV., BURLINGTON.
Environmental Study of ERTS-1 Imagery: Lake Champlain and Vermont,
W74-02581 7B

VIENNA UNIV. (AUSTRIA). ANALYTISCHES INSTITUT.
Anionic Exchange Separations of the Elements that can be Extracted with Tributyl Phosphate. II, (Anionenaustauschtrennungen der mit Tributylphosphat extrahierbaren Elemente. II),
W74-02432 2K

Determination of Small Amounts of Uranium After Concentrating Through Extraction and Anionic Exchange in a Solvent Agent System Containing Tri-N-Octylphosphine Oxide. (Bestimmung geringer Uranmengen nach Konzentrierun g durch Extraktion und Anionenaustausch in einem tri-n-octylphoshinoxidhaltigen Losungsmittelsystem),
W74-02434 5A

VOLCANI INST. OF AGRICULTURAL RESEARCH, BET-DAGAN (ISRAEL). DEPT. OF SOIL AND WATER.
Saturated-Unsaturated Seepage by Finite Elements,
W74-02313 2G

VORONEZHSKII LESOTEKHNICHESKII INSTITUT (USSR).
Study of the Intracellular Water State in Plants Under the Effect of Phenols, (In Russian),
W74-02234 2I

WAIKATO UNIV., HAMILTON (NEW ZEALAND). DEPT. OF EARTH SCIENCES.
The Relationships Between Land Use and Erosion in the Central North Island, New Zealand,
W74-02287 4D

WASHINGTON STATE DEPT. OF FISHERIES, OLYMPIA.
Puget Sound Resident Coho Salmon Study,
W74-02639 2L

WATER RESEARCH ASSOCIATION, MARLOW (ENGLAND).
The Removal of Organic Compounds in the Production of Potable Water,
W74-02265 5F

WATER RESOURCES COUNCIL, WASHINGTON, D.C.
A Summary Analysis of Nineteen Tests of Proposed Evaluation Procedures on Selected Water and Land Resource Projects.
W74-02188 6B

WATERLOO UNIV. (ONTARIO). DEPT. OF CHEMISTRY.
Sampling Techniques in Chromatography,
W74-02372 7B

WEST VIRGINIA UNIV., MORGANTOWN. DEPT. OF BIOLOGY.
The Effects of Acid Mine Water on Growth (Number and Size) of Chlorelia vulgaris,
W74-02168 5C

The Growth of Chlorella vulgaris in Sewage and Acid Mine Water,
W74-02169 5C

WINDSOR UNIV. (ONTARIO). DEPT. OF CHEMISTRY.
Pyridine Ketoximes as Analytical Reagents: The Spectrophotometric Determination of Cobalt with 2-Pyridyl-2-Thienyl-Beta-Ketoxime,
W74-02364 5A

WISCONSIN UNIV., MADISON.
Long Waves in Shallow Triangular Channels,
W74-02158 2E

Toxaphene Accumulation in Fish in Lakes Treated for Rough Fish Control,
W74-02425 5C

WISCONSIN UNIV., MADISON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Dispersion of Substances from Well Recharge Operations in an Anisotropic, Homogeneous Confined Aquifer,
W74-02454 2F

WISCONSIN UNIV., MADISON. DEPT. OF SOIL SCIENCE.
Contribution of Developed and Natural Marshland Soils to Surface and Subsurface Water Quality,
W74-02327 5B

WISCONSIN UNIV., MADISON. MARINE RESEARCH LAB.
Sedimentation and Scour Off Nuclear Power Plants,
W74-02645 2J

WISCONSIN UNIV., MILWAUKEE. AIR POLLUTION ANALYSIS LAB.
ERTS-1 Views the Great Lakes,
W74-02602 7B

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Intercalibration of Analyses of Recently Biosynthesized Hydrocarbons and Petroleum Hydrocarbons in Marine Lipids,
W74-02390 5A

Research Pertinent to Environmental Quality Concerning the Period, 1967-1971.
W74-02648 2L

WORCESTER POLYTECHNIC INST., MASS. ALDEN RESEARCH LABS.
Adjustment of Friction in Hydraulic Models of Lakes,
W74-02314 2H

WYOMING UNIV., LARAMIE. DIV. OF AGRICULTURAL ECONOMICS.
Financing Private Water Resource Development: Analysis of A State Loan Program,
W74-02221 3F

WYOMING UNIV., LARAMIE. WATER RESOURCES RESEARCH INST.
Evaporation from Snowdrifts Under Oasis Conditions,
W74-02183 2D

Measuring Snowfall, A Critical Factor for Snow Resource Management,
W74-02184 2C

Psychrometric Data Patterns and Prediction Models,
W74-02220 2B

Elevation Dependent Model for Estimating Annual Runoff,
W74-02317 2A

YAMAGATA UNIV. (JAPAN). LAB. OF SCIENCE EDUCATION.
Some Limnological Remarks on Lake Saizuchi-Numa, Yamagata Prefecture, (In Japanese),
W74-02207 5C

ZENTRALSTELLE FUER GEO-PHOTOGRAMMETRIE UND FERNERKUNDUNG, MUNICH (WEST GERMANY).
New Aspects on the Tectonic of the Alps and the Apennines Revealed by ERTS-1 Data,
W74-02564 7B

ACCESSION NUMBER INDEX

W74-02151 5B
W74-02152 5B
W74-02153 5B
W74-02154 5B
W74-02155 5B
W74-02156 5B
W74-02157 5B
W74-02158 2E
W74-02159 7C
W74-02160 2J
W74-02161 2E
W74-02162 8B
W74-02163 5B
W74-02164 5A
W74-02165 5B
W74-02166 5B
W74-02167 2K
W74-02168 5C
W74-02169 5C
W74-02170 5A
W74-02171 4A
W74-02172 2A
W74-02173 2E
W74-02174 2E
W74-02175 5D
W74-02176 5D
W74-02177 5D
W74-02178 5B
W74-02179 5D
W74-02180 5B
W74-02181 5A
W74-02182 5A
W74-02183 2D
W74-02184 2C
W74-02185 2L
W74-02186 5D
W74-02187 2E
W74-02188 6B
W74-02189 5B
W74-02190 2K
W74-02191 5B
W74-02192 2G
W74-02193 2G
W74-02194 2G
W74-02195 5C
W74-02196 5C
W74-02197 5C
W74-02198 5B
W74-02199 5B
W74-02200 2G
W74-02201 5C
W74-02202 6B
W74-02203 6B
W74-02204 6B
W74-02205 4A
W74-02206 2F
W74-02207 5C
W74-02208 5D
W74-02209 2E
W74-02210 5B
W74-02211 5B
W74-02212 6B
W74-02213 5G
W74-02214 4A
W74-02215 4A
W74-02216 5C
W74-02217 5C
W74-02218 2F
W74-02219 4B
W74-02220 2B
W74-02221 3F
W74-02222 5D
W74-02223 3D
W74-02224 4D
W74-02225 5D
W74-02226 5C
W74-02227 5G
W74-02228 8I
W74-02229 5F
W74-02230 5F
W74-02231 5B
W74-02232 5B
W74-02233 5B
W74-02234 2I
W74-02235 5C
W74-02236 2I
W74-02237 2I
W74-02238 2I
W74-02239 3F
W74-02240 3F
W74-02241 8I
W74-02242 5B
W74-02243 2I
W74-02244 5B
W74-02245 5C
W74-02246 2H
W74-02247 5D
W74-02248 7B
W74-02249 7B
W74-02250 2E
W74-02251 5D
W74-02252 5B
W74-02253 5B
W74-02254 3B
W74-02255 5B
W74-02256 5D
W74-02257 5D
W74-02258 5D
W74-02259 5D
W74-02260 3F
W74-02261 2H
W74-02262 5D
W74-02263 5D
W74-02264 5D
W74-02265 5F
W74-02266 5D
W74-02267 5D
W74-02268 5D
W74-02269 5D
W74-02270 5D
W74-02271 5F
W74-02272 5D
W74-02273 5D
W74-02274 5D
W74-02275 5D
W74-02276 5C
W74-02277 5C
W74-02278 5D
W74-02279 5D
W74-02280 5D
W74-02281 5D
W74-02282 5E
W74-02283 5D
W74-02284 5D
W74-02285 5D
W74-02286 5D
W74-02287 4D
W74-02288 2J
W74-02289 2D
W74-02290 2E
W74-02291 2A
W74-02292 6C
W74-02293 3B
W74-02294 2C
W74-02295 4C
W74-02296 2L
W74-02297 8I
W74-02298 2E
W74-02299 2E
W74-02300 2G
W74-02301 2G
W74-02302 2G
W74-02303 2G
W74-02304 2G
W74-02305 2E
W74-02306 2J
W74-02307 2G
W74-02308 2A
W74-02309 8B
W74-02310 2E
W74-02311 8B
W74-02312 8B
W74-02313 2G
W74-02314 2H
W74-02315 2E
W74-02316 8B
W74-02317 2A
W74-02318 5B
W74-02319 4A
W74-02320 2F
W74-02321 5C
W74-02322 4B
W74-02323 4B
W74-02324 4B
W74-02325 3F
W74-02326 5D
W74-02327 5B
W74-02328 5D
W74-02329 5D
W74-02330 5D
W74-02331 3D
W74-02332 6B
W74-02333 2G
W74-02334 5D
W74-02335 5D
W74-02336 5D
W74-02337 5D
W74-02338 5D
W74-02339 3D
W74-02340 4B
W74-02341 2H
W74-02342 5C
W74-02343 5A
W74-02344 2H
W74-02345 5B
W74-02346 3B
W74-02347 3F
W74-02348 2B
W74-02349 4A
W74-02350 6B
W74-02351 4D
W74-02352 6A
W74-02353 4B
W74-02354 3F
W74-02355 2G
W74-02356 5B
W74-02357 4B
W74-02358 6B
W74-02359 3A
W74-02360 5A
W74-02361 5A
W74-02362 5A
W74-02363 5B
W74-02364 5A
W74-02365 5B
W74-02366 2K
W74-02367 2K
W74-02368 5A
W74-02369 5B
W74-02370 5B
W74-02371 5B
W74-02372 7B
W74-02373 5B
W74-02374 5A
W74-02375 5C
W74-02376 2K
W74-02377 5B
W74-02378 5A
W74-02379 5A
W74-02380 5B
W74-02381 5B
W74-02382 5B
W74-02383 5B
W74-02384 5A
W74-02385 5A
W74-02386 2H
W74-02387 5A
W74-02388 5A
W74-02389 5A
W74-02390 5A
W74-02391 5A
W74-02392 5A
W74-02393 5A
W74-02394 5B
W74-02395 5A
W74-02396 5A
W74-02397 5A
W74-02398 5A
W74-02399 5A
W74-02400 5A
W74-02401 5C
W74-02402 2K
W74-02403 5A
W74-02404 5A
W74-02405 5A
W74-02406 2K
W74-02407 7B
W74-02408 5A
W74-02409 5A
W74-02410 7B
W74-02411 2K
W74-02412 5A
W74-02413 5A
W74-02414 2K
W74-02415 2K
W74-02416 5C
W74-02417 5A
W74-02418 5A
W74-02419 5A
W74-02420 5B
W74-02421 5A
W74-02422 2H
W74-02423 5A
W74-02424 5A
W74-02425 5C
W74-02426 5A
W74-02427 5A
W74-02428 5A
W74-02429 5B
W74-02430 2K
W74-02431 5A
W74-02432 2K
W74-02433 5A
W74-02434 5A
W74-02435 5B
W74-02436 5A
W74-02437 5D
W74-02438 6A
W74-02439 6B
W74-02440 5D
W74-02441 5A
W74-02442 4C
W74-02443 5B
W74-02444 5C
W74-02445 5A
W74-02446 2F
W74-02447 2C
W74-02448 2H
W74-02449 5C
W74-02450 5C
W74-02451 5C
W74-02452 2F
W74-02453 6C
W74-02454 2F
W74-02455 6A
W74-02456 6B
W74-02457 6B
W74-02458 6B
W74-02459 6B
W74-02460 5B
W74-02461 3A
W74-02462 6B

W74-02463 6B
W74-02464 2G
W74-02465 5B
W74-02466 4B
W74-02467 7B
W74-02468 4B
W74-02469 2A
W74-02470 2C
W74-02471 2E
W74-02472 4B
W74-02473 5B
W74-02474 2E
W74-02475 8C
W74-02476 5A
W74-02477 2E
W74-02478 2E
W74-02479 7C
W74-02480 7C
W74-02481 2L
W74-02482 5B
W74-02483 5D
W74-02484 5D
W74-02485 5D
W74-02486 5D
W74-02487 5D
W74-02488 5G
W74-02489 5D
W74-02490 3A
W74-02491 5G
W74-02492 5G
W74-02493 5A
W74-02494 5G
W74-02495 5G
W74-02496 3A
W74-02497 6E
W74-02498 6E
W74-02499 6E
W74-02500 6E
W74-02501 6E
W74-02502 5G
W74-02503 4A
W74-02504 4A
W74-02505 6E
W74-02506 5G
W74-02507 2I
W74-02508 6E
W74-02509 6E
W74-02510 2L
W74-02511 5G
W74-02512 6E
W74-02513 6E
W74-02514 6E
W74-02515 6E
W74-02516 6E
W74-02517 6E
W74-02518 6E
W74-02519 6E
W74-02520 6E
W74-02521 6E
W74-02522 6E
W74-02523 6E
W74-02524 6E
W74-02525 6E
W74-02526 6E
W74-02527 6E
W74-02528 6E
W74-02529 6E
W74-02530 6E
W74-02531 6E
W74-02532 6E
W74-02533 3F
W74-02534 6E
W74-02535 5D
W74-02536 6E
W74-02537 6E
W74-02538 5G
W74-02539 5G
W74-02540 6E
W74-02541 5B
W74-02542 2I
W74-02543 5C
W74-02544 5C
W74-02545 2I
W74-02546 2G
W74-02547 5B
W74-02548 5B
W74-02549 2H
W74-02550 2H
W74-02551 7B
W74-02552 2C
W74-02553 2I
W74-02554 3F
W74-02555 2K
W74-02556 5C
W74-02557 5B
W74-02558 2H
W74-02559 2H
W74-02560 2H
W74-02561 7B
W74-02562 7B
W74-02563 7B
W74-02564 7B
W74-02565 7B
W74-02566 7B
W74-02567 7B
W74-02568 7B
W74-02569 7B
W74-02570 7B
W74-02571 7B
W74-02572 7B
W74-02573 7B
W74-02574 7B
W74-02575 7B
W74-02576 7B
W74-02577 7B
W74-02578 7B
W74-02579 7B
W74-02580 7B
W74-02581 7B
W74-02582 7B
W74-02583 7B
W74-02584 7B
W74-02585 7B
W74-02586 7B
W74-02587 7B
W74-02588 7B
W74-02589 7B
W74-02590 7B
W74-02591 7B
W74-02592 7B
W74-02593 7B
W74-02594 7B
W74-02595 7B
W74-02596 7B
W74-02597 7B
W74-02598 7B
W74-02599 7B
W74-02600 7B
W74-02601 7B
W74-02602 7B
W74-02603 7B
W74-02604 7B
W74-02605 2C
W74-02606 2B
W74-02607 2B
W74-02608 2K
W74-02609 2F
W74-02610 2D
W74-02611 2F
W74-02612 2K
W74-02613 2C
W74-02614 2C
W74-02615 2E
W74-02616 2A
W74-02617 2E
W74-02618 5G
W74-02619 2E
W74-02620 2F
W74-02621 5B
W74-02622 2A
W74-02623 2G
W74-02624 2C
W74-02625 2E
W74-02626 4D
W74-02627 2A
W74-02628 5E
W74-02629 5B
W74-02630 2D
W74-02631 2B
W74-02632 2B
W74-02633 2L
W74-02634 5D
W74-02635 5G
W74-02636 5G
W74-02637 2L
W74-02638 2L
W74-02639 2L
W74-02640 2L
W74-02641 2H
W74-02642 2L
W74-02643 5G
W74-02644 5C
W74-02645 2J
W74-02646 2L
W74-02647 2L
W74-02648 2L
W74-02649 2E
W74-02650 2H

ABSTRACT SOURCES

Source	Accession Number	Total
A. Centers of Competence		
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W74-02189 02360 -- 02385 02387 -- 02400 02402 -- 02421 02423 -- 02436	75
Cornell University, Policy Models for Water Resources Systems	W74-02222 -- 02225 02455	5
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W74-02247 -- 02251 02254 -- 02259 02262 -- 02286	36
University of Arizona, Arid Land Water Resources	W74-02346 -- 02353 02355 -- 02359	13
University of Florida, Eastern U. S. Water Law	W74-02188 02497 -- 02506 02508 -- 02540	44
University of North Carolina, Metropolitan Water Resources Planning and Management	W74-02186	1
U. S. Geological Survey, Hydrology	W74-02151 -- 02165 02185, 02206 02287 -- 02319 02456 -- 02482 02561 -- 02630	147
B. State Water Resources Research Institutes		
Alabama Water Resources Research Institute	W74-02211 02440 -- 02441	3
Arizona Water Resources Research Center	W74-02208 -- 02209	2
California Water Resources Center	W74-02442	1
Connecticut Institute of Water Resources	W74-02170	1
Delaware Water Resources Center	W74-02320, 02443	2
Georgia Environmental Resources Center	W74-02210, 02212	2
Hawaii Water Resources Research Center	W74-02631	1
Idaho Water Resources Research Institute	W74-02321 -- 02322 02444	3
Illinois Water Resources Center	W74-02166	1
Kansas Water Resources Research Institute	W74-02213, 02323	2

ABSTRACT SOURCES

Source	Accession Number	Total
B. State Water Resources Research Institutes (Cont'd)		
Massachusetts Water Resources Research Center	W74-02324	1
Missouri Water Resources Research Center	W74-02167, 02445	2
Montana Water Resources Research Center	W74-02214 -- 02215 02446 -- 02449	6
New Jersey Water Resources Research Institute	W74-02450 -- 02451	2
New Mexico Water Resources Research Institute	W74-02452	1
New York Water Resources and Marine Sciences Center	W74-02216 -- 02217	2
North Carolina Water Resources Research Institute	W74-02632	1
Ohio Water Resources Center	W74-02218 -- 02219	2
Oregon Water Resources Research Institute	W74-02453	1
Tennessee Water Resources Research Center	W74-02326, 02483	2
West Virginia Water Research Institute	W74-02168 -- 02169	2
Wisconsin Water Resources Center	W74-02327, 02454	2
Wyoming Water Resources Research Institute	W74-02183 -- 02184 02220 -- 02221	4
C. Other		
BioSciences Information Service	W74-02190 -- 02200 02207 02226 -- 02246 02252 -- 02253 02260 -- 02261 02325, 02341 02343 -- 02344 02354, 02386 02401, 02422 02507 02541 -- 02560 02650	67
Calspan Corporation	W74-02175 -- 02182	8
Enginerring Aspects of Urban Water Resources (Poertner)	W74-02328 -- 02340 02342, 02345	15
Ocean Engineering Information Service	W74-02187 02633 -- 02649	18
Ocean Engineering Information Service (Patents)	W74-02484 -- 02496	13
Office of Water Resources Research	W74-02201 -- 02205 02437 -- 02439	8
Soil Conservation Service	W74-02171 -- 02174	4

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

7 RESOURCES DATA

8 ENGINEERING WORKS

9 MANPOWER, GRANTS, AND FACILITIES

10 SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
Springfield Va 22151

OFFICIAL BUSINESS

PRINTED MATTER

6. 33391
: 48

THE LIBRARY OF THE
5 1974
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 6
MARCH 15, 1974

W74-02651 -- W74-03200

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

SELECTED WATER RESOURCES ABSTRACTS is available to Federal agencies, contractors, or grantees in water resources upon request to: Manager, Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior, Washington, D. C. 20240.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from the National Technical Information Service. Annual subscription is $45 (domestic), $56.25 (foreign). Certain documents abstracted in this journal can be purchased from the NTIS at prices indicated in the entry. Prepayment is required.

SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Deoartment of the Interior

VOLUME 7, NUMBER 6
MARCH 15, 1974

W74-02651 -- W74-03200

e Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is neces-
ıry in the transaction of the public business required by law of this Department. Use of funds for printing this pe-
odical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

THE IONIC ACTIVITY FUNCTION OF WATER AND THE ACTIVITY COEFFICIENT OF THE HYDROGEN ION IN SEAWATER,
Sydney Univ. (Australia). Dept. of Physical Chemistry.
J. V. Leyendekkers.
Limnology and Oceanography, Vol 18, No 5, p 784-787, September 1973. 1 fig, 3 tab, 14 ref.

Descriptors: *Hydrogen ion concentration, *Sea water, *Water chemistry, *Ionization.
Identifiers: Ion activity function.

The activity coefficient of the hydrogen ion in seawater was calculated for the ranges S±5-48 parts per thousand and 0-40 deg C, on the basis of a simple ion interaction theory that accounts only for pairwise interactions. The ionic activity function of water was estimated and compared with the values in other salt solutions. (Knapp-USGS)
W74-02760

THERMAL RADIATIVE PROPERTIES OF A SMOOTH AIR-WATER INTERFACE,
Missouri Univ. Rolla. Dept. of Mechanical and Aerospace Engineering.
For primary bibliographic entry see Field 02K.
W74-02874

INFLUENCE OF SOLVATION FACTORS ON ACIDITY. VOLUMES OF IONIZATION OF THE META AND PARA ISOMERS OF NITROPHENOL AND FORMYLPHENOL IN WATER AT 25 DEG,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
C. L. Liotta, A. Abidaud, and H. P. Hopkins, Jr.
Journal of the American Chemical Society, Vol 94, p 8624, August 1972. 1 tab, 14 ref. OWRR B-049-GA (8). 14-31-0001-3269.

Descriptors: Acids, *Ionization, *Phenols, Entropy, *Acidity, *Solvation, Solutes, Solvents, Volume, *Analytical techniques.

The volumes of ionization of meta- and para-nitro and formylphenol have been determined in water at 25 deg using high precision density measurements. The results are analyzed in terms of solute-solvent interaction mechanisms. Based upon the data it appears that the solvation contribution to differences in acidity of isomeric phenols may have their primary origin in solvation differences in the un-ionized forms. (See also W74-03140)
W74-03139

THERMODYNAMICS OF ACID-BASE EQUILIBRIA. III. IONIZATION OF SUBSTITUTED ANILINIUM IONS,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
C. L. Liotta, E. M. Perdue, and H. P. Hopkins, Jr.
Journal of the American Chemical Society, Vol 95, p 2439-2445, 1973. 2 fig, 3 tab, 29 ref. OWRR B-049-GA (9). 14-31-0001-3269.

Descriptors: *Ionization, *Enthalpy, Entropy, *Acid-Base equilibrium, Ions, *Thermodynamics, Analytical techniques, Aqueous solutions.
Identifiers: Gibbs free-energy, Electrostatic theory, Calorimetrically, *Anilinium ions.

The standard enthalpies of ionization of 21 meta- and para-substituted anilinium ions have been determined calorimetrically in aqueous solution at 25 deg. Standard entropies of ionization have been calculated from the experimental enthalpies of ionization and the literature Gibbs free energies of ionization. Both the enthalpies and entropies of ionization show a good linear correlation with the Gibbs free energy of ionization. The experimental results have been analyzed in terms of Hepler's theory of substituent effects and have been compared to the predictions of electrostatic theory. (See also W74-03149)
W74-03140

02. WATER CYCLE

2A. General

MEAN RAINFALL AND MEAN RUNOFF IN SOUTH AFRICA; AN INVESTIGATION INTO PHASE DIFFERENCES,
Natal Univ., Durban (South Africa); and Saint Andrews Univ.
R. A. Preston-Whyte, and G. W. Whittington.
The South African Geographical Journal, Vol 54, p 133-137, 1972. 2 fig, 1 tab, 12 ref.

Descriptors: *Rainfall-runoff relationships, *Fourier analysis, *Time lag, *Runoff, Rainfall, Subsurface runoff.
Identifiers: *South Africa.

Monthly rainfall normals for 356 stations in South Africa, and mean monthly runoff values for 90 gauging stations, were subjected to harmonic analysis. The time lag between mean rainfall and mean runoff was then calculated from the curve maxima of contiguous stations, whereupon regional variations in lag were mapped. The lag is attributable to the delayed contribution of subsurface flow to channel runoff. (DWA)
W74-02909

LAND USE AND WATER RESOURCES,
East Malling Research Station, Maidstone, (England).
H. C. Pereira.
Cambridge University Press, New York, 1973. 260 p, 31 fig, 7 tab, 26 plates $14.95 cloth $5.95 paper.

Descriptors: *Water demand, Demand, *Land use, *Water resources development, *Watersheds (Basins), *Forest watersheds, Crops, Irrigation, Drainage, Research priorities, Grazing, Animals.

Contents include: The world's water resources and the growing demand; development of a watershed discipline; the achievement of hydrological information; recorded experinence of the effects of forests on watersheds; research on forested watersheds; watershed experiments in tropical forests; the effects of grazing animals on watersheds; the effects of croplands on water resources; the roles of irrigation and drainage in water resources; and problems and priorities.
W74-03024

UNCERTAINTY IN THE RETURN PERIOD OF MAXIMUM EVENTS: A BAYESIAN APPROACH,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 02B.
W74-03137

A DECISION-THEORETIC APPROACH TO UNCERTAINTY IN THE RETURN PERIOD OF MAXIMUM FLOW VOLUMES USING RAINFALL DATA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
D. R. Davis, L. Duckstein, C. C. Kisiel, and M. M. Fogel.
Paper presented at Symposium on Design of Water Resource Projects with Inadequate Data, UNESCO, Madrid, Spain, June 1973. 12 p. OWRR B-032-ARIZ (2). 14-31-0001-3858.

Descriptors: *Rainfall-runoff relationships, *Risks, Watershed management, *Decision making, Optimization, Mathematical models, Stochastic processes, Simulation analysis, Systems analysis, *Distribution patterns, *Rainfall disposition, Simulated rainfall.

The maximum seasonal runoff volume for an ungaged stream site is derived using (1) an event-based rainfall model for thunderstorms, and (2) a linear rainfall-runoff model. Major emphasis is placed on effect of uncertainty in parameters of rainfall inputs on the return period of maximum runoff volumes in a season. The event-based rainfall model derives a correct distribution function for the return period under uncertainty, and demonstrates the necessity of following this approach for a decision-theoretic analysis of a water resource design problem. The approach enables us to design structures, relying only on rainfall data, on watersheds with ungaged streams by taking into account uncertainty of design site parameters. Also, the design can be tailored to a specific problem rather than using a pre-specified design flood, such as the 100-year flood. (See also W74-03137)
W74-03138

2B. Precipitation

HURRICANE SURGE FREQUENCY ESTIMATED FOR THE GULF COAST OF TEXAS,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-02700

FOG DRIP FROM ARTIFICIAL LEAVES IN A FOG WIND TUNNEL,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 02I.
W74-02765

HIGH REYNOLDS NUMBERS UNSTEADY CONVECTIVE MASS TRANSFER FROM FLUID SPHERES,
New York Univ., N.Y.
V-D. Dang, and E. Ruckenstein.
International Journal of Heat and Mass Transfer, Vol 16, No 7, p 1371-1384, 1973. 8 fig, 2 tab, 15 ref, append.

Descriptors: *Heat transfer, *Mass transfer, *Convection, Fluid mechanics, Hydraulics, Flow, Diffusion, Chemical reactions, Mathematics, Equations, Model studies, *Reynolds number.
Identifiers: *Fluid spheres, Sherwood Number, Schmidt Number, First order reaction.

Unsteady state mass transfer between a single or binary component fluid sphere and the continuous phase at high Reynolds number flow is examined when diffusion is accompanied (or not) by a first order chemical reaction. The velocity distribution derived by Chao is used in the calculations. The similarity transformation suggested by Ruckenstein is applied to find the mass transfer in the absence of chemical reactions from a single component fluid sphere. For mass transfer with or without chemical reactions from a binary fluid sphere, the same transformation is combined with Duhamel's theorem in order to obtain the solution. Asymptotic expressions for the Sherwood number for pure mass transfer from a single component fluid sphere and for the case in which diffusion is accompanied by a first order irreversible chemical

reaction are derived. For binary component fluid spheres the quasi steady state assumption (QSSA) is examined and its resultscompared with exact analysis. (Jerome-Vanderbilt)
W74-02891

THE CONTENT OF WATER VAPOUR IN THE ATMOSPHERE OVER SOUTHERN AFRICA,
Natal Univ., Pietermaritzburg (South Africa).
O. S. McGee.
South African Geographer, Vol 4, No 1, p 25-33, September 1972. 8 fig, 6 ref.

Descriptors: *Precipitable water, *Water vapor, *Precipitation (Atmospheric), *Radiosondes, Atmosphere, Meteorology, Moisture content.
Identifiers: *Specific humidity, Vapor content, Aerological stations, South Africa.

All available radiosonde data from 7 aerological stations in South Africa were used to obtain daily values of specific humidity at the earth's surface and at standard reporting levels extending to the 300 mb level (10,000 m). These data were used to analyze the distribution of precipitable water over the subcontinent, the annual march of mean monthly precipitable water, the levels below which stipulated percentages of mean monthly precipitable water vapor occurred, and the variability of precipitable water vapor within each month. The mean specific humidity and the diurnal variations of water vapor content were also analyzed. The atmosphere's vapor content bears no resemblance to measured precipitation. Little hope exists for fomalizing any mutual relationship unless some measure of rainfall - producing mechanisms can be incorporated. (DWA)
W74-02913

COMPUTATION OF THE SENSIBLE HEAT FLUX AND ITS RELATION TO OTHER COMPONENTS OF THE HEAT BALANCE AT THE SURFACE,
Hebrew Univ., Jerusalem (Israel). Dept. of Meteorology.
For primary bibliographic entry see Field 02D.
W74-02940

COASTAL STORMS OF THE EASTERN UNITED STATES,
Thornthwaite (C.W.) Associates, Elmer, N.J. Lab. of climatology.
J. R. Mather, H. Adams, III, and G. A. Yoshioka.
Journal of Applied Meteorology, Vol 3, No 6, p 693-706, December 1964. 8 fig, 4 tab. ONR Contract Nonr 4043 (00).

Descriptors: *Storms, Damages, Hurricanes, *Seasonal, Coasts, Cyclones, *Waves (Water), United States.
Identifiers: *Geographic distribution.

Storms resulting in damage to the East Coast of the United States over the past 42 years have been classified into eight different synoptic situations: hurricanes; wave developments well east of the southeast coast or in the vicinity of Cuba; wave developments over Florida or the nearby Atlantic coastal waters; wave developments in the Gulf of Mexico west of 85W longitude; inland depressions that deepen upon reaching the coast; secondary cyclonic disturbances in the Hatteras area; intense cyclones moving northeastward, west of the coast; and strong cold fronts with associated squall lines. The seasonal and geographical distributions of these storm types are investigated. Coastal storms of moderate to severe intensity might be expected at any place along the East Coast of the United States on an average of once every 1.4 years in New York and New Jersey, the area of most frequent occurrence, to once every 4.2 years in Georgia, the area of least frequent occurrence. (Sinha-OEIS)
W74-03098

THE GREAT ATLANTIC COAST TIDES OF 5-8 MARCH 1962,
Princeton Univ. N.J. Dept. of Astronomical Physics.
For primary bibliographic entry see Field 02J.
W74-03099

UNCERTAINTY IN THE RETURN PERIOD OF MAXIMUM EVENTS: A BAYESIAN APPROACH,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
D. Davis, L. Duckstein, C. Kisiel, and M. Fogel.
Paper presented at International Symposium on Uncertainties in Hydrologic and Water Resource Systems, University of Arizona, Tucson, Dec. 11-14, 1972. 10 p, 2 fig, 1 tab, 16 ref. OWRR B-032-ARIZ (1). 14-31-0001-3858.

Descriptors: *Rainfall disposition, *Distribution patterns, Watershed management, Decision making, Optimization, Mathematical models, Stochastic processes, Simulation analysis, Systems analysis, *Risks, *Simulated rainfall, Probability, Rainfall-runoff relationships.
Identifiers: *Bayesian approach.

Previous work determined that the return period of maximum point rainfall could be derived from the following event-based process valid for the summer precipitation season: (a) the number of events per season is Poisson distributed, (b) the amount of point rainfall per event may be exponentially distributed, (c) the above two random variables are independent. The purpose of this paper is (1) to obtain a correct distribution function of the return period when uncertainty arises in the parameters of the Poisson and exponential distributions and (2) to obtain the probability density function of the event corresponding to a given return stemming from the same uncertainty. The methodology employs conjugate distributions for the Poisson and exponential distributions to permit direct computation of posterior distributions of rainfall amounts given point rainfall data. Computer simulation shows that errors in estimated return periods lead to underdesign even with 20 years of data (for the example used in the analysis). Extensions of the method are possible to encompass effects of uncertainties in rainfall data samples on runoff estimates and associated economic factors. (See also W74-03138)
W74-03137

A DECISION-THEORETIC APPROACH TO UNCERTAINTY IN THE RETURN PERIOD OF MAXIMUM FLOW VOLUMES USING RAINFALL DATA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 02A.
W74-03138

2C. Snow, Ice, and Frost

ABLATION CHARACTERISTICS OF AN ALPINE SNOW FIELD IN SUMMER,
Forest Service (USDA), Provo, Utah. Intermountain Forest and Range Experiment Station.
L. R. Bartos, and P. A. Rechard.
Available from the National Technical Information Service as PB-226 320 $2.75 in paper copy, $1.45 in microfiche. Partial Completion Report, (1973). 9 p, 2 fig, 9 ref. OWRR C-3129 (no 3690) (1). 14-31-0001-3690.

Descriptors: *Ablation, *Wyoming, Alpine, *Snow, Snowmelt, Seasonal.

Ablation characteristics of a summer alpine snow field in the Klondike Lake area, Medicine Bow Mountains, Wyoming, were investigated, and it was found that the mean summer ablation rate was 6.00 plus or minus 0.5 cm/day. The total change in volume of water in the snow field was determined using two techniques, mean surface ablation and area-elevation relationship based on topographic survey. Physical characteristics of the subsurface snow, such as snow density, and free water content were also evaluated.
W74-02653

SIMULATION MODEL FOR EVALUATION OF INTERCEPTION LOSS FROM FOREST TREES, PART I. MODELING SNOW INTERCEPTION ON CONIFERS AND PART II. LABORATORY MODELING OF SNOW INTERCEPTION ON TREES,
Idaho Univ., Moscow. Coll. of Forestry.
For primary bibliographic entry see Field 02I.
W74-02656

SNOW SURVEY MEASUREMENTS THROUGH 1970,
California State Dept. of Water Resources, Sacramento. Snow Surveys and Water Supply Forecasting Section.
V. H. Lemons.
Available from State of California, Documents Section, P. O. Box 20191, Sacramento, Calif. 95820 Price $5.00. Bulletin No 129-70, September 1971. 504 p, 16 plate.

Descriptors: *Snow surveys, *Snow cover, *Water equivalent, *California, Data collections, Measurement, Snowpacks, Snowfall, Depth, Density, Analytical techniques, Cores, Snowmelt, Runoff, Water resources.

This publication makes available to cooperators in the California Cooperative Snow Surveys Program, and others concerned with snow hydrology, an updated summary of historical snow course and aerial snow depth marker data through 1970 which is compatible with data currently being collected. This summary supersedes that published in March 1965. Snow data include that obtained by standard snow survey methods on established courses as well as supplementary measurements obtained from aerial snow depth markers. (Data obtained from automatic snow sensors are published in a separate summary). Prior to 1966 water contents for aerial snow depth markers were not estimated. Data tables are arranged in order to hydrographic area, river basin, and elevation of snow courses or aerial markers within the basin. Location of snow courses and aerial snow depth marks are shown on the basin maps. (Woodard-USGS)
W74-02738

ADVANCES IN NORTH AMERICAN AVALANCHE TECHNOLOGY: 1972 SYMPOSIUM.
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.

Proceedings of USDA Forest Service National Avalanche Training Program, Reno, Nev, November 16-17, 1972: Forest Service General Technical Report RM-3, September 1973.

Descriptors: *Avalanches, *Snowpacks, Stress, Strain, Conferences, Explosives, Failure (Mechanics), Strength, Density, Elasticity (Mechanical), Creep, Deformation, Forecasting.
Identifiers: *Snow mechanics.

As part of its National Avalanche Training Program, the USDA Forest Service hosted a symposium at Reno, Nevada, on November 16 and 17, 1972. The opening contribution by W. St. Lawrence and C. Bradley reports on acoustic signals emitted by snow under stress. One breakthrough is mentioned-the discovery of the Kaiser acoustic effect in snow. St. Lawrence and Bradley envision that acoustic emission phenomena, including the Kaiser effect, amay have important applications for testing the struc-

tural integrity of avalanche slopes. The next four contributions discuss various aspects of snow slab mechanics. This research is motivated by needs of the ski industry to control the slab avalanche problem. Since the basic mechanics of slab release are unknown, many uncertainties exist about how to artifically release slab avalanches with explosives. The paper by M. Mellor is a start in explaining how explosives can be used rationally and systematically in avalanche technology. Canadian research, however, has looked into the problems of avalanche dynamics. In a brief report P. A. Schaerer presents a practical way of computing impact pressure of moving avalanches. (See W74-02741 thru W74-02747) (Knapp-USGS)
W74-02740

ULTRASONIC EMISSIONS IN SNOW,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
W. St. Lawrence, and C. Bradley.
In: Proceedings of USDA Forest Service National Avalanche Training Program, Reno, Nev, November 16-17, 1972: Forest Service General Technical Report RM-3, p 1-6, September 1973. 3 fig, 6 ref. Army Grant DA-ARO-D-31-124-71-G59.

Descriptors: *Acoustics, *Snowpacks, *Avalanches, *Sound waves, *Ultrasonics, Stress, Strain, Slopes, Snow cover, Failure (Mechanics), Deformation.
Identifiers: *Snow mechanics.

Burst-type acoustic signals were monitored in snow subjected to various load and deformation histories over a wide range of frequencies. The pattern of the acoustic response is closely related to the particular load or deformation history applied. Examination of the emission pattern suggests a description of the deformation of snow in terms of a structural mechanism. A possible application of the acoustic emission technique is making in situ measurements of the state of stress in an active snow slope. These measurements may be useful for use in predicting and controlling avalanches. (See also W74-02740) (Knapp-USGS)
W74-02741

INCORPORATION OF GLIDE AND CREEP MEASUREMENTS INTO SNOW SLAB MECHANICS,
Washington Univ., Seattle. Dept. of Civil Engineering.
C. B. Brown, R. J. Evans, and D. McClung.
In: Proceedings of USDA Forest Service National Avalanche Training Program, Reno, Nev, November 16-17, 1972: Forest Service General Technical Report RM-3, p 7-13, September 1973. 3 fig, 7 ref.

Descriptors: *Avalanches, *Snowpacks, *Creep, *Shear, Stress, Strain, Slopes, Snow cover, Strength of materials, Failure (Mechanics), Deformation.
Identifiers: *Snow mechanics.

The conventional field measurements in slab avalanche control include snow strength, creep, and glide. On a gliding interface in the snow material a continuous process involves healing and fracture, associated with regelation. Creep speeds are of the same order as glide speeds. Both features are therefore equally important in any analytical formulation. One avenue of avalanche prediction concerns the attenuation of basal shear capacity. With regelation and a steady rate of strain over a substantial total interface area, some part of the interface will be melted and some frozen. Additionally, separation may occur. Averaged over the interface, this will account for some regions slipping locally and some just on the point of slipping. When the glide speed increases with no additional evidence of increase in snow strength, then conditions of incipient avalanching should be expected. (See also W74-02740) (Knapp-USGS)
W74-02742

MATERIAL PROPERTY AND BOUNDARY CONDITION EFFECTS ON STRESSES IN AVALANCHE SNOWPACKS,
Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
J. O. Curtis, and F. W. Smith.
In: Proceedings of USDA Forest Service National Avalanche Training Program, Reno, Nev, November 16-17, 1972: Forest Service General Technical Report RM-3, p 14-23, September 1973. 8 fig, 4 ref.

Descriptors: *Avalanches, *Simulation analysis, *Stress, *Snowpacks, Computer programs, Strain, Shear, Deformation, Finite element analysis, Failure (Mechanics), Mathematical models, Strength of materials, Youngs modulus, Shear strength, Tensile strength.
Identifiers: *Snow mechanics.

A mathematical model was developed for the prediction of stresses and displacements in an avalanche snowpack. The finite element model only accounts for elastic effects and therefore ignores the realistic effects of creep and plasticity. In spite of this limitation a considerable amount of insight to the stress distribution may be gained by such analysis. The analytical model was applied to a multilayered snowpack on Berthoud Pass, Colorado. The finite element computer program, utilizing triangular constant strain elements, was applied with the following assumptions: plain strain conditions exist in the snowpack; the top surface is stress free; each layer is isotropic; and a constant value of Young's modulus and Poisson's ratio exists throughout the snowpack. Layers of variable density snow influence the variation of stresses as a function of depth. Density will play an even greater part when Young's modulus and Poisson's ratio are made functions of this parameter. A shear failure in the bottom layer of snow below an observed fracture line was predicted by the model. Post-release investigations of the actual snowpack revealed that such a failure did take place. Through shear failure simulation, large tensile stresses parallel to the snow surface can be predicted within the top layer of snow. This condition might lead to tensile failure in the critical region. Field observation verified such an occurrence. (See also W74-02740) (Knapp-USGS)
W74-02743

ON THE MECHANICS OF THE HARD SLAB AVALANCHE,
Montana State Univ., Bozeman. Dept. of Civil Engineering and Engineering Mechanics.
T. E. Lang, and R. L. Brown.
In: Proceedings of USDA Forest Service National Avalanche Training Program, Reno, Nev, November 16-17, 1972: Forest Service General Technical Report RM-3, p 24-28, September 1973. 3 fig, 10 ref.

Descriptors: *Avalanches, *Snowpacks, *Creep, *Buckling, *Shear, Stress, Strain, Slopes, Snow cover, Strength of materials, Failure (Mechanics), Deformation.
Identifiers: *Snow mechanics.

The buckling of snow slabs is proposed as a failure mechanism of avalanche slopes. Buckling may initiate and grow under a wide range of conditions. Using a simplified analytical model and nominal material properties, the times computed for buckle mode growth are at least of the same order as times associated with the avalanche phenomenon. The possiblity exists for void formation and growth, depending upon the relative rates of snowpack settlement and slope-parallel creep, coupled with the necessity of a structurally weakened basal-plane zone. (See also W74-02740) (Knapp-USGS)
W74-02744

STATISTICAL PROBLEMS IN SNOW MECHANICS,
Forest Service USDA, Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. A. Sommerfeld.
In: Proceedings of USDA Forest Service National Avalanche Training Program, Reno, Nev, November 16-17, 1972: Forest Service General Technical Report RM-3, p 29-36, September 1973. 4 fig, 1 tab, 14 ref.

Descriptors: *Avalanches, *Snowpacks, *Statistics, *Statistical methods, Density, Water equivalent, Strength, Tensile strength, Shear strength, Failure (Mechanics), Deformation.
Identifiers: *Snow mechanics.

Different types of statistical treatments are appropriate for evaluating measurements of different physical properties of snow. For density measurements, the mean and standard deviation of the measurements are meaningful parameters. In the case of strength measurements, the mean is not a very useful parameter, and some type of extreme-value statistics should be used. Weibull statistics appear to be appropriate for tensile strength data, while the thread bundle statistics of Daniels appear appropriate for the evaluation of shear strength data. (See also W74-02740) (Knapp-USGS)
W74-02745

CONTROLLED RELEASE OF AVALANCHES BY EXPLOSIVES,
Cold Regions Research and Engineering Lab., Hanover, N.H.
M. Mellor.
In: Proceedings of USDA Forest Service National Service General Technical Report RM-3, p 37-49, September 1973. 6 fig, 17 ref, append.

Descriptors: *Avalanches, *Snowpacks, *Explosives, Failure (Mechanics), Strength, Density.
Identifiers: *Avalanche control, *Snow mechanics, *Blasting.

The effects of explosives and blasting agents on snow are discussed from the viewpoint of rock-blasting technology. Air-blast, crater formation, and ground motion are considered, and the characteristics of various types of explosives are outlined. Recent developments in the commercial manufacture of liquid and slurried explosives and blasting agents are described, and the possibilities for application of these materials in avalanche control are explored. (See also W74-02746) (Knapp-USGS)
W74-02746

OBSERVATIONS OF AVALANCHE IMPACT PRESSURES,
National Research Council of Canada, Ottawa, (Ontario). Div. of Building Research.
P. A. Schaerer.
In: Proceedings of USDA Forest Service National Avalanche Training Program, Reno, Nev, November 16-17, 1972: Forest Service General Technical Report RM-3, p 51-54, September 1973. 2 fig, 1 tab, 3 ref.

Descriptors: *Avalanches, *Pressure, Flow, Loads (Forces), Density, Velocity.
Identifiers: *Snow mechanics.

Observations were made of impact pressures produced by well developed dry snow avalanches. There is a strong variation of pressure during the passage of an avalanche. For practical purposes the impact pressure produced by dry snow avalanches is proportional to the square of the speed of the avalanche front and to the density of the deposited snow. (See also W74-02740) (Knapp-USGS)
W74-02747

PROTECTING OFFSHORE STRUCTURES FROM ICE,
Amoco Production Co., Tulsa, Okla. (assignee)
For primary bibliographic entry see Field 08C.
W74-03013

SNOWMELT LYSIMETERS PERFORM WELL IN COLD TEMPERATURES IN CENTRAL COLORADO,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
R. W. Schultz.
USDA Forest Service Research Note RM-247, September 1973. 8 p, 1 tab, 8 fig, 9 ref.

Descriptors: *Snowmelt, *Lysimeters, *Rocky Mountain Region, Instrumentation, Measurement, Watersheds (Divides), Winter, Temperature, Seasonal, Water types, Water sources, Costs.

The snowmelt lysimeter designed by H. F. Haupt (1969) has performed well in northern Idaho forests where relatively mild winter temperatures prevail. Compared with snow-tube measurements of melt rates, it provided reliable data on snowmelt also in the central Rocky Mountains under severe winter conditions, when field-tested above 3000 m altitude on the West St. Louis Creek watershed. The design and operation of the lysimeter are described. The cost of materials for each unit is estimated below $100, excluding the water level recorder. (Brown-IPC)
W74-03067

2D. Evaporation and Transpiration

FUNCTIONS TO PREDICT EFFECTS OF CROP WATER DEFICITS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 03F.
W74-02680

A STUDY OF EVAPOTRANSPIRATION FROM A DOUGLAS FIR FOREST USING THE ENERGY BALANCE APPROACH,
British Columbia Univ., Vancouver. Dept. of Soil Science.
K. G. McNaughton, and T. A. Black.
Water Resources Research, Vol 9, No 6, p 1579-1590, December 1973. 4 fig, 1 tab, 27 ref.

Descriptors: *Evapotranspiration, *Interception, *Forests, *Water balance, *Energy budget, Douglas fir trees, Winds, Evaporation, Transpiration.

Energy balance measurement of evapotranspiration from a young Douglas fir forest were made in a period of 18 days in July 1970 when soil water was not limiting. Peak daily evapotranspiration rates characteristically occurred 2-3 hours after solar noon, and evapotranspiration showed a short-term independence from net radiation. This behavior is as a consequence of the large forest roughness. Daily evapotranspiration and net radiation were well correlated. Values of surface diffusion resistance were calculated from Monteith's combination formula. Daytime values showed significant day-to-day differences, and an attempt to define a potential evapotranspiration rate by assuming a constant daytime surface resistance was not successful. Comparison of evapotranspiration measurements with a potential evaporation formula for wet surfaces developed by Priestley and Taylor suggests that evaporation of intercepted water proceeds 20% more rapidly than evapotranspiration from the nonwetted canopy. (Knapp-USGS)
W74-02764

FOREST TRANSPIRATION GREATLY SPEEDS STREAMFLOW RECESSION,
Forest Service (USDA), Durham, N.H. Northeastern Forest Experiment Station.
C. A. Federer.
Water Resources Research, Vol 9, No 6, p 1599-1604, December 1973. 3 fig, 2 tab, 12 ref.

Descriptors: *Transpiration, *Recession curves, *Base flow, *Rainfall-runoff relationships, Evapotranspiration, Water balance, Hydrologic budget, Forests, Temperature, Hydrograph analysis.
Identifiers: Hubbard Brook experimental watershed.

Streamflow recessions from a 42-ha forested watershed in New Hampshire are greatly affected by transpiration. In the dormant season, recession flow continues for many days at rates around 1 mm/day, whereas, in the growing season, streamflow rate declines in several days to less than 0.05 mm/day. Transitions between the two regimes occur in June and late September or early October, corresponding to the leaf out and color change phenology of the area. Elimination of transpiration by cutting and herbiciding a 16-ha watershed changed the rate of its summer recession from the rapid decline associated with transpiration to the slow recession characteristic of no transpiration. The recession without transpiration is probably maintained by slow drainage of unsaturated soil, since groundwater exists only during snowmelt on these steep watersheds. Rapid recession occurs when transpiration over the whole watershed removes soil water that would otherwise drain and become streamflow. (Knapp-USGS)
W74-02766

UNSATURATED FLOW PROPERTIES USED TO PREDICT OUTFLOW AND EVAPOTRANSPIRATION FROM A SLOPING LYSIMETER,
Forest Service (USDA), Tempe, Ariz. Forest Hydrology Lab.
D. G. Scholl, and A. R. Hibbert.
Water Resources Research, Vol 9, No 6, p 1645-1655, December 1973. 12 fig, 6 ref.

Descriptors: *Unsaturated flow, *Evapotranspiration, *Lysimeters, Hydraulic conductivity, Water balance, Soil water movement, Soil moisture, Rainfall-runoff relationships, Hydraulic models, Model studies.

Field measurements of soil moisture content and pressure potential were used to determine the moisture flux, hydraulic gradients, and dynamic conductivity of a 200-foot sloping soil lysimeter. These measurements were then used to predict outflow and evapotranspiration. A vertical unsaturated Darcian analysis was used to evaluate conductivity during the first study phase, in which evapotranspiration was eliminated by sealing the model surface with a plastic sheet. The moisture flux term in the Darcy equation was determined by evaluating moisture content change in depth and time. Moisture flux determined in this way agreed with measurements of actual outflow. Conductivities were solved from flux and hydraulic gradients and corresponding water contents were assigned. Conductivity curves were highly significant and agreed with those obtained when the model was uncovered. Evapotranspiration was solved during the second study phase (cover removed and grass established) by using a water balance based on moisture content and potential, rainfall, and conductivity (from the first study phase). Results at the deepest level in the profile agreed well with those based on actual outflow. (Knapp-USGS)
W74-02771

NUCLEAR POWER PLANT HEAT REJECTION IN AN ARID CLIMATE,
Omaha Public Power District, Neb.
For primary bibliographic entry see Field 05D.
W74-02887

COMPARATIVE TRANSPIRATION STUDIES OF SOME CAPE PROTEAS,
Cape Town Univ. (South Africa). Dept. of Botany.
K. H. Schutte.
South African Journal of Science, Vol 69, No 2, p 57-58, February, 1973. 1 fig, 2 tab, 2 ref.

Descriptors: *Transpiration, *Specific conductivity, Measurement.
Identifiers: *Proteas.

The transpiration and specific conductivity of 16 species of Protea were measured for the first time in the laboratory. Twigs cut from comparable one year old branches which had stood in water overnight were placed in flasks of water whose surface was then covered with oil. Leaf area was then determined. The flasks were then placed in controlled transpiration chambers and the transpiration at various temperatures between 20C and 45C was determined as the rate of loss of weight of the flasks per unit leaf area. The relative humidity was maintained at 75 plus or minus 3%. For reasons unknown the transpiration rate of some specimens proved to be much more temperature - dependent than that of the others. The specific conductivity, defined as the volume of water conducted by 1 cm 2 of wood in a 15 cm long twig in 15 minutes, was then determined for 8 Protea species using Farmer's method. Considerable variation was found between species, and for the same species at different times. Some of the Proteas had conductivities characteristic of evergreens, the others being intermediate between the conductivities of evergreens and deciduous plants. (DWA)
W74-02908

WATER REQUIREMENTS OF VARIOUS CROPS IN ARID AND SEMI-ARID ZONES OF TURKEY,
Soil Conservation Research Inst., Ankara (Turkey). Irrigation and Drainage Div.
For primary bibliographic entry see Field 03F.
W74-02937

COMPUTATION OF THE SENSIBLE HEAT FLUX AND ITS RELATION TO OTHER COMPONENTS OF THE HEAT BALANCE AT THE SURFACE,
Hebrew Univ., Jerusalem (Israel). Dept. of Meteorology.
J. Neumann.
Israel Journal of Agricultural Research, Vol 22, No 2, p 99-107, July 1972. 2 figs, 1 tab, 13 refs.

Descriptors: Air temperature, *Heat transfer, Radiation, *Heat flow, Turbulence, Environmental effects, Condensation, *Micrometeorology, Soil temperature, *Diurnal, *Nocturnal, Meteorology.
Identifiers: *Israel, Sensible heat flux.

In addition to calculating the horizontal and vertical components of the wind and other quantities of interest in dynamic meteorology, the author and Y. Mahrer have calculated some quantities of interest in micrometeorology, e.g. the vertical flux of sensible heat to and from the ground. Results of a theoretical computation of the vertical heat transfer to and from the central coastal plain of Israel are related to net radiation balance measurements conducted by the Israel Meteorological Service. By linking the aforementioned two fluxes, estimates are formed of the vertical flux of sensible heat in the soil. Processes of evaporation/condensation from the plain as a whole are believed to be unimportant in summer. Results suggest that the diurnal cycle can be divided into four phases according to the direction of the heat fluxes of sensible heat in air, and sensible heat in soil. Computations for daylight hours work out satisfactorily. Although the resulting value for the alternating heat storage is reasonable, the hour-to-hour balances, as distinct from the balance for three daylight phases, are not good. The balance for the night hours is not satisfactory and the most likely

cause of this imbalance lies in the fact that the physics of turbulent transfer under highly stable conditions is not understood, even to the limited extent which applies to other conditions of static stability. (Black-Arizona)
W74-02940

PRESSURE BOMB MEASUREMENTS INDICATE WATER AVAILABILITY IN A SOUTHWESTERN RIPARIAN COMMUNITY,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02G.
W74-03076

2E. Streamflow and Runoff

PARAMETRIC DETERMINATION OF MINIMUM STREAMFLOW FOR TROUT,
Wyoming Univ., Laramie. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08I.
W74-02670

AN INVESTIGATION OF THE DEFORMATION AND BREAKING OF SOLITARY WAVES,
Stanford Univ., Calif. Dept. of Civil Engineering.
F. E. Camfield, and R. L. Street.
Available from NTIS as AD-664 249, $6.00 in paper copy. Technical Report No 81, December 1967. 132 p, 30 fig, 36 ref, 2 append. Nonr-225 (85), NR 089-041.

Descriptors: *Beaches, *Waves (Water), Bores, Deformation, *Profiles.
Identifiers: *Shoaling, *Solitary waves, Wave run-up, Wave generation, *Breakers.

It is proposed that solitary waves can be used as the initial wave shape to simulate the shoaling, breaking and run-up of large, long waves on a beach. Experiments were conducted with solitary waves to determine criteria for wave growth, celerity, breaking height and run-up on various beach slopes. In addition, limited investigations were made of reflected bores, effects of variations in the bottom profile, and the effect of multiple slopes, i.e., one slope followed by a second, higher slope, on the breaking and run-up of solitary waves. Further considerations are given to the method of characteristics as a means of analyzing shoaling waves. A qualitative analysis is presented of the effect of vertical acceleration terms on the solution. A comparison is made with other analytical solutions for shoaling waves. The experimental results are tabulated and plotted comparisons of the experimental results and the various analytical methods for shoaling waves are presented. It is concluded that the present analytical methods do not adequately represent shoaling solitary waves and current design criteria for breaking heights and run-up of waves need to be improved. (Sinha-OEIS)
W74-02694

INVESTIGATIONS OF MARINE PROCESSES AND COASTAL LANDFORMS NEAR CRESCENT CITY, CALIFORNIA. VOLUME I. TECHNICAL DISCUSSION,
Atmospheric Research Group, Altadena, Calif.
J. A. Roberts, D. M. Bleistein, and R. Dolan.
Available from NTIS as AD-655 007, $6.00 in paper copy. Final report prepared for Army Natick Laboratories, Earth Sciences Division, July 1967. 83 p, 48 fig, 36 ref, 3 maps. DA 19-129-AMC-684 (N).

Descriptors: *California, *Beaches, Geomorphology, Winds, *Waves (Water), Tides, Profiles, Seasonal, *Sedimentation.
Identifiers: Crescent City (Calif), Littoral currents.

Results are presented of a study of the dynamics of South Beach located adjacent to Crescent City, California. The objectives were twofold: (1) to relate the beach dynamics to the overall morphology of the Smith River Plain, the region in which the beach is situated, and (2) to develop techniques to accomplish the study. The Smith River Plain is a lowland segment of the Klamath Mountains Province. The structure of the Plain is controlled by diastrophism. The general configuration of the Plain is controlled by location, orientation, and exposure of bedrock. To conduct the study within the scope of the project necessitated the selection of several key sites and the utilization of specialized sampling techniques for seasonal profiling and for short, intensive study. South Beach is an arcuate beach, about four miles in length, composed principally of medium to fine grained sands. The beach reflects only minor seasonal or tidal variability, and its configuration is controlled by its exposure to wave forces by local geomorphology. (Sinha-OEIS)
W74-02697

WATER WAVE RUN-UP ON A BEACH,
Service Bureau Corp., New York.
J. B. Keller, and H. B. Keller.
Available from NTIS as AD-608 864, $6.00 in paper copy. Research Report, June 1964. 21 p, 5 fig, 1 tab, 6 ref, 1 append. NONR-3828 (00).

Descriptors: *Shallow water, *Waves (Water), Tsunamis.
Identifiers: *Wave run-up, Linear theory, *Incident waves, *Bottom slope.

While investigating the Tsunami wave project, a numerical method was devised to solve the initial boundary value problem for the equations of the non-linear shallow water theory. The case of one horizontal dimension was considered in a domain bounded by a shore at one end, with the motion of the shoreline taken into account. In addition, this method enabled the incident wave to be introduced at the seaward end of the domain. The water was assumed to be at rest in the domain until the incident wave arrived, and the bottom was assumed to slope uniformly. (Sinha-OEIS)
W74-02698

ENERGY MEASUREMENTS IN THE SWASH--SURF ZONE,
University of Southern California, Los Angeles. Dept. of Geology.
A. Schiffman.
Limnology and Oceanography, Vol 10, No 2, p 255-260, April 1965. 6 fig, 1 tab, 7 ref.

Descriptors: *Energy, *Beaches, Sediments, *Waves (Water), Sampling, Surf, *Dynamometers, Flow, Instrumentation.
Identifiers: Breaker zone, Swash, *Fluid flow.

A technique has been devised for obtaining energy and sediment data in the swash-surf zone of a beach. The instruments used are a bidirectional compression spring dynamometer and a rapid surface sand sampler that have been designed specifically for use shoreward of the breakers. On the basis of the information gathered to date, three distinct depositional environments have been defined inside the breaker zone. These are: (1) the swash zone, (2) the surf zone, and (3) a well defined transition zone separating the first two. (Sinha-OEIS)
W74-02702

SEA LEVEL AS AFFECTED BY RIVER RUNOFF, EASTERN UNITED STATES,
Geological Survey, Woods Hole, Mass.
R. H. Meade, and K. O. Emery.
Science, Vol 173, p 425-428, July 30, 1971. 2 fig, 1 tab, 10 ref.

Descriptors: *Sea level, *River flow, *Runoff, Coasts, Atlantic Ocean, Gulf of Mexico.

Variations in annual river inflow account for 7 to 21 percent of the total variation in average annual sea level along the Atlantic and Gulf of Mexico coasts of the United States. This compares with 29 to 68 percent of the total variation that can be attributed to the secular rise of sea level, and with 10 to 50 percent of the variation that cannot be attributed to either the river inflow or the secular rise. (Sinha-OEIS)
W74-02709

BREAKER TYPE CLASSIFICATION ON THREE LABORATORY BEACHES,
Army Coastal Engineering Research Center, Washington, D.C.
C. J. Galvin, Jr.
Journal of Geophysical Research, Vol 73, No 12, p 3651-3659, June 15, 1968. 6 fig, 7 tab, 23 ref.

Descriptors: *Waves (Water), *Beaches, *Hydrodynamics, Coasts.
Identifiers: *Breakers, Spilling breakers, Plunging breakers, Collapsing breakers, Surging breakers.

Breaker types on three laboratory beaches are quantitatively classified. This classification is made empirically by correlating dimensionless steepness parameters, based on wave height, wave period, and beach slope, with the breaker type obtained from films of a wide range of conditions. Breaker type, for waves on smooth concrete slopes depends on beach slope, wave period, and either deep-water or breaker height. For forty-three varied laboratory conditions, breaker type can be sorted fairly well by either of two dimensionless combinations of these variable, an offshore parameter, or an inshore parameter. As either of these parameters increases, breaker type changes from surging or collapsing to plunging to spilling. For the offshore and inshore parameters, respectively, the surge-plunge transition values are about 0.09 and 0.003 and the plunge-spill transition values are about 4.8 and 0.068. The deep-water heights in the offshore parameter were computed from linear, wave-generator theory. Breaker type data were obtained from films of breaking waves for conditions that produced a dominant breaker type, free from interference by secondary waves. (Sinha-OEIS)
W74-02712

A NUMERICAL MODEL OF COASTAL UPWELLING,
National Center for Atmospheric Research, Boulder, Colo.
J. J. O'Brien, and H. E. Hurlburt.
Journal of Physical Oceanography, Vol 2, No 1, p 14-26, January 1972. 19 fig, 1 tab, 22 ref.

Descriptors: *Coasts, *Upwelling, Stratification, *Model studies, *Water circulation, Continental shelf, *Oregon.
Identifiers: Numerical models, Baroclinic surface jet, *Wind stress, *Pynocline, Ekman drift.

A wind-driven model of coastal upwelling induced into a stratified, rotating ocean is solved numerically. The circulation is on an f plane and longshore variations are neglected. A multilevel model is derived, but only solutions for a two-layer model are discussed. A longshore baroclinic surface jet is discovered. The time-dependent geostrophic jet is dynamically explained by conservation of potential vorticity. The existence of the jet depends critically on stratification and non-zero wind stress at the coast. Coastal upwelling is confined to within 30 km of the shore. The model exhibits no deep countercurrent during active coastal upwelling. A time scale of the order of 10 days or longer is required for a pycnocline at 50 m depth to penetrate the surface. Solutions for a wide coastal shelf, an irregular shallow shelf, and a continental slope region are illustrated. A secondary upwelling region is found offshore at sharp breaks in the shelf topography. In all cases, the offshore flow is a simple Ekman drift and downd-

welling offshore is created by Ekman pumping caused by negative wind-stress curl. (Sinha - OEIS)
W74-02713

WATER RESOURCES DATA FOR COLORADO, 1972: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 07C.
W74-02724

CONSTRUCTION OF A MAP OF AVERAGE ANNUAL RUNOFF FOR NORTH KAZAKHSTAN (POSTROYENIYE KARTY NORMY STOKA SEVERNOGO KAZAKHSTANA),
Moscow State Univ. (USSR). Dept. of Hydrobiology.
L. G. Pomerantseva.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 3, p 86-89, May-June 1973. 1 fig.

Descriptors: *Average runoff, *Annual, *Maps, *Lakes, *Water balance, Inflow, Precipitation (Atmospheric), Evaporation, Infiltration, Watersheds (Basins), Equations.
Identifiers: *USSR (North Kazakhstan).

Depth-of-runoff values obtained from a water-balance equation for 434 lakes were used to construct a map of average long-term depth of runoff for North Kazakhstan. The method of determining major items in the water balance of lakes is described, and a map of average annual depth of runoff shows average long-term runoff values, based on observation data of 30 hydrometric stations for 1892-1967. (Josefson-USGS)
W74-02751

INVESTIGATION OF CORRELATION OF ANNUAL RUNOFF FOR APPALACHIAN RIVERS (ISSLEDOVANIYE KORRELYATIVNOY SVYAZI GODOVOGO STOKA APPALACHSKIKH REK),
Moscow State Univ. (USSR). Dept. of Hydrobiology.
V. N. Busarov.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 3, p 102-105, May-June 1973. 2 fig, 5 ref.

Descriptors: *Runoff, *Annual, Rivers, Mountains, *Correlation analysis, Variability, Seasonal, Maps, *Appalachian mountain region.
Identifiers: USSR.

Investigation of relation of annual runoff of mountain streams in different regions of the Appalachians has revealed the presence of zones of synchronous and asynchronous runoff. A change in the coefficient of correlation is irregular in all directions from the sample river. Areas of close correlation of annual runoff, bounded by isocorrelates 0.9, 0.8, and 0.7, can be identified about the sample rivers. The boundary of the isocorrelates does not correspond to the boundaries of individual river basins but encompasses larger areas. Rivers in the four regions bounded by isocorrelate 0.7 have a synchronous seasonal runoff distribution with the sample river and with each other. Rivers in other regions differ significantly in seasonal variation of runoff. Correlative association of annual runoff can be used to divide an area into hydrologic regions. (Josefson-USGS)
W74-02752

ROLE OF DEPTH OF CHANNEL DOWNCUTTING IN THE FORMATION OF LOW FLOW IN MOUNTAIN STREAMS (ROL' GLUBINY VREZA RUSEL V FORMIROVANII MAZHENNOGO STOKA GORNYKH REK),
Moscow State Univ. (USSR). Dept. of Hydrobiology.
V. M. Mikhaylov.
Vestnik Moskovskogo Universiteta, Seriya V, Geografiya, No 3, p 98-102, May-June 1973. 2 fig, 1 tab, 2 ref.

Descriptors: *Low flow, *Channel morphology, *Streams, *Mountains, Elevation, Watersheds (Basins), Hydrogeology.
Identifiers: *USSR (Pamirs-Tien Shan).

Investigation of the relation of low-flow runoff to basin elevation was based on water-regime data and morphometric parameters for 53 streams in the Pamirs and Tien Shan. On the basis of low flows and channel morphology, the area was divided into three regions: (1) southwestern part of the Pamir-Alay Mountains; (2) Western Tien Shan; and (3) Inner Tien Shan (excluding the Issyk-Kul' Depression) and the Eastern Pamirs. An increase in low flow with increasing basin elevation is observed only to certain heights, after which an increase in elevation is accompanied by reduced low flows. Hydrogeological conditions in a basin have a significant effect on low-flow values. (Josefson-USGS)
W74-02753

KARST WATERS OF THE CAUCASUS (KARSTOVYYE VODY BOL'SHOGO KAVKAZA),
L. A. Vladimirov, and G. N. Gigineyshvili.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 105, No 4, p 358-362, July-August 1973. 3 ref.

Descriptors: *Karst, *Karst hydrology, *Mountains, Groundwater, Subsurface drainage, Limestones.
Identifiers: *USSR, *Caucasus, Karst processes, Karst springs, Karst lakes.

In hydrographic features and conditions of supply, karst waters of the Caucasus are divided into springs, underground streams, intermittent underground-surface streams, surface streams that reflect the influence of karst processes, and karst lakes. Karst springs are abundant in the eastern part of the Western Caucasus, where karst processes are strongly developed on the Arabika, Rikhva, Bzybi, and Okhachkuye massifs. The largest springs in the Caucasus are the Mchishta Spring which has an average annual discharge of 9,500 liters a second and the Kyafar-Agur Spring which has an average annual discharge of 7,500 liters a second. Fifty springs on the southern slope of the Caucasus have a discharge exceeding 100 liters a second. Of these, only 3 (Apenistskaro, Patmasuri, and Zinobani) are located in the Eastern Caucasus, while the remainder are almost evenly divided between the Western and Middle Caucasus. Underground karst streams are divided into streams that obtain their supplies from a karst basin; streams formed by interception; and streams formed as a result of total collapse of the surface stream. Three types of surface karst streams are found in mountainous areas: (1) small streams formed from karst springs; (2) small streams which are a surface continuation of an underground stream; and (3) small streams formed outside a karst region but whose discharge and regimen are influenced by karst processes. The number of karst lakes in the Caucasus is small. (Josefson-USGS)
W74-02756

DISPERSAL PROCESSES OF FRESHWATERS IN THE PO RIVER COASTAL AREA,
Osservatorio Geofisico Sperimentale, Trieste (Italy).
G. Grancini, and B. Cescon.
Limnology and Oceanography, Vol 18, No 5, p 705-710, September 1973. 6 fig, 2 tab, 17 ref.

Descriptors: *Dispersion, *Saline water-freshwater interfaces, Mixing, Salinity, Density stratification, Saline water intrusion, Estuaries.
Identifiers: Po River (Italy).

Tidal effects on the vertical structure and dynamic pattern of freshwater plume in the Po River coastal area were evaluated. A large vertical density gradient just below the surface and a lateral density front separate the fresh and seawaters. The horizontal extent of the river waters was traced by analyzing nitrates. The effluent from the Po River produces in the coastal area a surface pool of low salinity water that is moved by wind, tidal, and hydraulic forces. Changes of the vertical structure resemble an internal tidal wave. (Knapp-USGS)
W74-02758

USE OF CENSORED DATA IN THE ESTIMATION OF GUMBEL DISTRIBUTION PARAMETERS FOR ANNUAL MAXIMUM FLOOD SERIES,
Institute of Hydrology, Wallingford (England).
M. N. Leese.
Water Resources Research, Vol 9, No 6, p 1534-1542, December 1973. 2 tab, 10 ref, append.

Descriptors: *Floods, *Statistics, *Statistical methods, *Data collections, *Sampling, Probability, Flood forecasting, Flood recurrence interval, Flood data, Flood frequency.

Maximum likelihood equations for the estimation of Gumbel distribution parameters from censored samples are derived, and expressions for their large sample standard errors are given. Censored samples arising in annual maximum flood series are described, and it is shown that a set of historic floodmarks may, under certain assumptions, be combined with recent noncensored data, to form what is essentially a censored sample. Maximum likelihood methods are applied to such a sample and the resulting estimates are compared with those obtained from the recent data alone. The estimates agree closely, and the use of the extra information contained in the historic floodmarks is shown to lead to a reduction in the large sample standard errors of the estimates. (Knapp-USGS)
W74-02763

APPLICATION OF THE IMPLICIT METHOD TO SURGES IN OPEN CHANNELS,
Rummel, Klepper and Kohl, Baltimore, Md.
Y. M. Chaudhry, and D. N. Contractor.
Water Resources Research, Vol 9, No 6, p 1605-1612, December 1973. 8 fig, 17 ref.

Descriptors: *Open channel flow, *Surges, *Waves (Water), Numerical analysis, Gradually varied flow, Unsteady flow, Bores, Seiches, Finite element analysis.

A technique is proposed by which continuous numerical computation of flows with surges in open channels can be handled with an implicit formulation. The one-dimensional gradually varied flow equations of continuity and momentum are written in finite difference form. A computer program was written to solve the problem in which the discharge hydrograph is given at the upstream end of a channel and a stage-discharge relationship is specified at the downstream end. This program was applied to different flow situations in laboratory channels and natural rivers. A weighting parameter (theta) ± 0.5 produced results with a steep wave front but with considerable numerical instability. The use of theta ± 1.0 gave results with considerable diffusion of the wave front. The use of theta ± 0.60 produced results that had a steep wave front and only a minor degree of numerical instability. This value of theta resulted in good agreement between calculated and measured hydrographs at the downstream end of the channel in most applications. However, the optimum value of theta depends on channel friction and the steepness of the wave front. (Knapp-USGS)
W74-02767

MINIMIZATION OF POWER EXPENDITURE IN A RIFFLE-POOL ALLUVIAL CHANNEL,
Wisconsin Univ., Milwaukee. Dept. of Geological Sciences.
For primary bibliographic entry see Field 02J.
W74-02768

HYDRODYNAMICS OF LAMINAR FLOW OVER A POROUS BED,
Saskatchewan Univ., Saskatoon. Div. of Hydrology.
W. Lin, and D. I. Norum.
Water Resources Research, Vol 9, No 6, p 1637-1644, December 1973. 5 fig, 21 ref.

Descriptors: *Overland flow, *Infiltration, Equations, Porous media, Numerical analysis, Surface-groundwater relationships, Hydrodynamics, Laminar flow.

Equations defining overland flow over a porous bed under different time-variable infiltration conditions are presented. Experimental data for non-rainfall events were obtained from a laminar model that used horizontal capillary tubes to synthesize the infiltration process. Tests were conducted at different discharges and slopes. The results from these tests were in close agreement with those obtained from numerical solutions of the theoretical hydrodynamic equations. (Knapp-USGS)
W74-02770

CROSS CORRELATION OF THE LOGARITHMS OF ESTIMATES OF MEAN STREAMFLOWS,
Geological Survey, Washington, D.C., Water Resources Div.
M. E. Moss.
Water Resources Research, Vol 9, No 6, p 1681-1683, December 1973. 1 fig, 1 tab, 7 ref.

Descriptors: *Statistics, *Statistical methods, *Streamflow, *Data collections, Correlation analysis, Streamflow forecasting, Stream gages.

A methodology is presented that yields estimates of the cross-correlation coefficients of the logarithms of estimates of mean discharges at two gaging stations with records that are not completely concurrent. The correlation coefficients of the logarithms of the estimates differ only slightly from the correlation coefficients of the estimates themselves. (Knapp-USGS)
W74-02775

COMPARISON OF METHODS OF DERIVING UNIT HYDROGRAPHS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
K. Jawed.
Available from the National Technical Information Service as PB-226 571 $11.25 in paper copy, $1.45 in microfiche. M Sc Thesis, August 1973. 166 p, 26 fig, 15 tab, 72 ref, 6 append. OWRR B-064-COLO (8), Agreement A-31-001-3565.

Descriptors: *Rainfall-runoff relationships, *Streamflow forecasting, *Hydrographs, Methodology, Model studies, Correlation analysis, Evaluation, Storm runoff, Peak discharge, Watersheds (Basins), Hydrology.

The suitability of using various methods for deriving unit hydrographs for small rural watersheds was investigated. The flood events were selected from the Colorado State University small watershed data file. The catchment areas for the watersheds in the data file range from 0.1 to 40 square miles. Two approaches--parametrid system synthesis (routing techniques) and nonparametric system analysis (convolution techniques) were used. The routing techniques give nonoscillating unit hydrographs which are physically realizable. The peak rate of discharge and the time to peak are well defined by these methods. Thus, these parameters can be better used for further studies, such as correlations with watershed parameters, sensitivity to storm characteristics, etc. (Woodard-USGS)
W74-02828

RIVERS AS DYNAMIC SYSTEMS,
Army Engineer District, Vicksburg, Miss.
B. R. Winkley, D. B. Simons, and S. A. Schumm.
American Society of Civil Engineers Task Committee Report, New York, January 1973. 24 p, 3 fig, 39 ref.

Descriptors: *Rivers, *Potamology, *River flow, *Geology, *Geography, Geomorphology, Meanders, River beds, Streams, Dynamics.
Identifiers: *River system dynamics.

A river is frequently considered to be static in shape, dimension, pattern and location; while in actuality, an alluvial river is generally continuously changing its character. The movement of a river can be caused either by natural conditions or by changes brought about by man. Both types of changes are governed by the same basic forces and the river engineer should have competent knowledge about: (1) geological factors, including soil conditions; (2) hydrologic factors, including impending changes in flows, runoff, and possible effects of changes in land use; (3) geometric characteristics of the stream; and (4) hydraulic characteristics of streams. Although most stream changes will be gradual, movements of stream beds at a rate of 2,500 feet per year have been recorded. Even for the Mississippi River, rates of 630 feet a year have been noted near Rosedale, Mississippi. River movement on a certain stream, at a specific location, may vary considerably over a period of years. Mathematical modeling of river dynamics provides a method of predicting both short-term and long-term time changes. Practical solutions involve mathematical modeling; further development of these models should increase their usefulness. (Poertner)
W74-02857

ON GENERALIZED HYDRODYNAMIC EQUATIONS USED IN HEAT TRANSFER THEORY,
Akademiya Navuk BSSR, Minsk. Inst. of Heat and Mass Transfer.
For primary bibliographic entry see Field 08B.
W74-02880

MEAN RAINFALL AND MEAN RUNOFF IN SOUTH AFRICA; AN INVESTIGATION INTO PHASE DIFFERENCES,
Natal Univ., Durban (South Africa); and Saint Andrews Univ.
For primary bibliographic entry see Field 02A.
W74-02909

CURRENTS AND WATER MASSES,
Ministry of Agriculture, Fisheries and Food, Lowestoft, (England).
H. W. Hill.
In: North Sea Science; Proceedings of NATO North Sea Science Conference, November 15-20, 1971, Aviemore, Scotland: Massachusetts Institute of Technology, p 17-42, 1973. 12 fig, 27 ref.

Descriptors: *Ocean currents, *Currents (Water), Thermal stratification, Oceanography, *Ocean circulation, Data collections, Density stratification, Tides.
Identifiers: *North Sea, Water masses.

The three primary and five secondary water masses in the North Sea are the North Atlantic, Channel, and Skagerrak (primary) and Scottish Coastal, English Coastal, Continental Coastal, Northern North Sea, and Central North Sea (secondary). The main influx probably occurs during the months of September to February. All but the Skagerrak water mass occupy the whole water column. In general, the northern North Sea, away from the coastal areas, is thermally stratified in summer, and in the Skagerrak and eastern and central North Sea there is seasonal or annual haline stratification. The main inflows are from the north, through the Straits of Dover and from the Baltic, while the main outflow is probably along the Norwegian coast. Some eddy systems are probable between these major streams. Bottom currents are broadly similar, but a seasonal variability is evident around the southwest Dogger Bank and towards the Lincolnshire coast. Recent current measurements suggest that there is a considerable degree of variability in space and time in surface and subsurface residuals. (Knapp-USGS)
W74-03029

DIFFUSION,
Deutsches Hydrogaraphisches Institut, Hamburg (West Germany).
For primary bibliographic entry see Field 05B.
W74-03030

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70--PART 6. MISSOURI RIVER BASIN: VOLUME 2. MISSOURI RIVER BASIN FROM WILLISTON, NORTH DAKOTA, TO SIOUX CITY, IOWA.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-03035

THE SURFACE WATERS OFF THE COAST OF KERALA, SOUTH-WEST INDIA,
M. Darbyshore.
Deep-Sea Research, Vol 14, p 295-320, June 1967. 28 fig, 9 ref, append.

Descriptors: *Thermocline, *Seasonal, *Salinity, *Currents (Water), Freshwater, Coasts, *Monsoons, Hydrography, Sea Water.
Identifiers: *India (Kerala), Arabian Sea Water, Equatorial Sea Water, Water masses.

The surface waters between the coast of Kerala and the meridian 72 degrees E are studied. T-S diagrams and temperature-depth profiles are drawn. A sharp thermocline is found to be associated with the Arabian Sea Water. This occurs immediately below the surface in summer, but in winter the upper limits sink to a depth of about 100 m and the top layer is occupied by a water mass of considerably lower salinity which is termed here Equatorial Surface Water. The movements of this water mass can be correlated with the current system of the north equatorial region. During the latter part of the monsoon season and for a few weeks afterwards, there is a very strong flow of fresh water from the backwater which extend seawards as as tongues of a very low salinity water at the surface. The effect of the freshwater influx on the annual salinity pattern is discussed. (Sinha-OEIS)
W74-03103

MASS TRANSPORT IN WATER WAVES. PART I. THEORY. PART II. EXPERIMENTS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 02J.
W74-03108

CORRELATION OF LITTORAL TRANSPORT WITH WAVE ENERGY ALONG SHORES OF NEW YORK AND NEW JERSEY,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02J.
W74-03112

2F. Groundwater

PROBLEMS OF UNDERGROUND STORAGE OF WASTES,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 05B.
W74-02732

FLOW CHARACTERISTICS OF A SUBSURFACE-CONTROLLED RECHARGE BASIN ON LONG ISLAND, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 04B.
W74-02734

HYDRODYNAMICS OF LAMINAR FLOW OVER A POROUS BED,
Saskatchewan Univ., Saskatoon. Div. of Hydrology.
For primary bibliographic entry see Field 02E.
W74-02770

A GALERKIN-FINITE ELEMENT SIMULATION OF GROUNDWATER CONTAMINATION OF LONG ISLAND, NEW YORK,
Princeton Univ., N.J. Dept. of Civil and Geological Engineering.
For primary bibliographic entry see Field 05B.
W74-02772

DRAWDOWN DISTRIBUTION DUE TO WELL FIELDS IN COUPLED IN COUPLED LEAKY AQUIFERS, 1. INFINITE AQUIFER SYSTEM,
Illinois Univ., Chicago. Dept. of Geological Sciences.
Z. A. Saleem, and C. E. Jacob.
Water Resources Research, Vol 9, No 6, p 1671-1678, December 1973. 1 fig, 14 ref.

Descriptors: *Drawdown, *Artesian aquifers, *Aquifer systems, Leakage, Mathematical studies, Equations, Aquifer characteristics, Confined water.
Identifiers: *Leaky artesian aquifers.

Solutions for drawdown distribution caused by the pumping of well fields in single aquifers were obtained for a limited number of cases. However, most of the aquifers in nature are not single isolated aquifers. Consequently, the use of presently available solutions can yield unreasonable results. Equations for the drawdown distribution caused by the pumping of well fields in two coupled leaky aquifers are presented. Two cases of the system are analyzed. Case 1 is the upper aquifer when it is confined or unconfined and the drawdown in it is very small in comparison with its saturated thickness; in case 2 the drawdown in the upper unconfined aquifer can be significant. Approximate solutions for relatively short and long times, as well as solutions for special cases, are presented. The solutions involve integrals that can be evaluated by using a digital computer. (Knapp-USGS)
W74-02773

GROUND-WATER BASIC DATA FOR GRIGGS AND STEELE COUNTIES, NORTH DAKOTA,
Geological Survey, Bismarck, N.Dak.
J. S. Downey, R. D. Hutchinson, and G. L. Sunderland.
North Dakota State Water Commission County Ground-Water Studies 21--Part II, and North Dakota Geological Survey Bulletin 64--Part II, 1973. 468 p, 2 fig, 4 tab, 25 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Well data, *Water quality, *North Dakota, Aquifer characteristics, Water wells, Lithologic logs, Water levels, Chemical analysis, Basic data collections, Hydrologic data.
Identifiers: *Griggs and Steele Counties (ND).

Data on the hydrologic investigation in Griggs and Steele Counties, N. Dak., were collected chiefly between 1969 and 1972, and consists of the following: (1) geologic and hydrologic data for 1,190 wells and test holdes; (2) water-level measurements in 155 observation wells; (3) lithologic and geophysical logs of 414 test holes and wells; and (4) chemical analyses of 297 water samples. The mineral constituents and physical properties of water include the concentrations of silica, iron, manganese, calcium, magnesium, sodium, potassium, bicarbonate, carbonate, sulfate, chloride fluoride, nitrate, boron, and dissolved solids. Values for hardness, noncarbonate hardness, sodium-adsorption ratio, percent sodium, specific conductance, pH, and water temperature are also given. (Woodard-USGS)
W74-02776

HYDRODYNAMICS OF ARTIFICIAL GROUNDWATER RECHARGE (SATURATED FLOW THEORY),
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 04B.
W74-03091

GROUNDWATER MOVEMENT,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 04B.
W74-03142

PROPER HYDRATION OF CLAYS FOR ROCK PROPERTY DETERMINATIONS,
Core Lab., Inc., Dallas, Tex.
D. C. Bush, and R. E. Jenkins.
Journal of Petroleum Technology, Vol 22, No 7, p 800-804, July, 1970. 4 fig, 1 tab, 15 ref.

Descriptors: *Sandstones, *Porosity, *Permeability, *Porous media, *Clays, Sand aquifers, Cores, Adsorption, Bound water, Expansive clays, Montmorillonite, Laboratory tests, Humidity.
Identifiers: *Core analysis procedures.

Most sand formations have some clay minerals associated with the sand particles. In the use of core analysis data for the calibration of down-hole logging tools whose responses are interpreted in terms of rock properties, pore water should be distinguished from the adsorbed (nonliquid) water associated with clays. Porosity and permeability measurements are affected also by adsorbed water. A survey of the literature on adsorption of water by clays indicates that one to two molecular layers of adsorbed water is the proper amount to consider as part of the rock volume. The porosity equivalent represented by the last two layers of adsorbed water is about 0.33 percent porosity for one percent montmorillonite in the sample. The recommended procedure for clayey samples is to dry the specimen in a controlled 40 percent relative humidity at a temperature of 140 to 145F to constant weight. Tests were made on sandstone cores to show the effect of further drying at 175 to 180F. In general, the permeability (to air) of the dry samples showed an increasing error with decreasing permeability. Similarly, there was an increasing error in dry porosity values with decreasing porosity values. At a value of 20 percent porosity (partially humidified condition) the error in a completely dried sample containing about 10 percent swelling clay was about 25 percent of the value, or 5 porosity percent. Error was only 4 percent in a relatively clay-free sandstone. (Gray-NWWA)
W74-03153

SEISMIC-REFRACTION AND EARTH-RESISTIVITY INVESTIGATION OF HYDROGEOLOGIC PROBLEMS IN THE HUMBOLDT RIVER BASIN, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
W. W. Dudley, Jr., and L. D. McGinnis.
Technical Report No 1, April 1, 1962. 29 p, 10 fig, 19 ref.

Descriptors: *Groundwater, Geophysics, *Seismic studies, *Resistivity, Electrical studies, Subsurface investigations, *Nevada.
Identifiers: *Humboldt River Basin (Nev), *Test-well drilling, Basalt, Consolidated sediments, Alluvial sediments, Flood plain deposits, Valley fill.

Experiments with seismic refraction and electrical resistivity instruments were conducted in the vicinity of Winnemucca, Nevada, an area in which the detailed geology is well-known, to determine the value of the geophysical methods in ground water studies. It was concluded that the seismic refraction method can be used to predict depth to bedrock and thickness of valley fill with considerable accuracy. Determination of the lithology and hydrologic characteristics of earth materials is less certain. The earth resistivity method is not as useful as seismic refraction but it may aid in interpreting lithology if used with sufficient control. Conjunctive use of the two methods does not produce as much useable information as test-well drilling but can result in material reduction of the number and depth of test wells necessary for acquiring needed information. Reconnaissance geophysics early in an investigation aids greatly in defining areas where test drilling is most needed. (Hunt-NWWA)
W74-03155

DEVELOPMENT IN DEEP SANDSTONE AQUIFER ALONG THE ILLINOIS RIVER IN LA SALLE COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 04B.
W74-03163

PLANNING AND ANALYSIS OF PULSE-TESTS,
Continental Oil Co., Ponca City, Okla.
W. E. Brigham.
Journal of Petroleum Technology, Vol 22, No 5, p 618-624, May, 1970. 6 fig, 2 tab, 4 ref.

Descriptors: *Transmissivity, *Storage coefficient, *Aquifer characteristics, Porous media, Porosity, Permeability, Flow, Testing, *Testing procedures.
Identifiers: *Pulse test, Well pair, Buildup, Interference.

Approximate equations are developed for the analysis of pulse-test data. Graphs illustrate the pulse-test pressure response and the effect of pulse time. The over-all range of pulse time is only about ten-fold. The pulse-test should be designed so that pulse times fall about in the middle of the effective range. An example problem shows how to predetermine pulse time. Inhomogeneities, geometry and boundaries are recognized as factors that affect the magnitude and timing of the response but they are not included in the simplified treatment given. If the pulse-test is planned so that production times and shut-in times are equal, the response can be determined by the equations given. The calculations can be made rapidly. Transmissibility and storage include the properties of compressibility, viscosity, porosity, permeability and reservoir thickness. Because specific values for only two of these properties can be determined by pulse-testing, the other three must be determined by other means. The time required to make a pulse-test is about the same as for a conventional interference test. (Gray-NWWA)
W74-03164

2G. Water in Soils

THE MEASUREMENT OF THE HEAT OF REACTION BETWEEN PROTEINS AND CLAY MINERALS BY MICROCALORIMETRY,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
B. M. Kilcullen.
Available from the National Technical Information Service as PB-226 416 $5.75 in paper copy, $1.45 in microfiche. M Sc Thesis, May 1973. 65 p, 11 fig, 15 tab, 33 ref, 3 append. OWRR A-020-NH (2).

Descriptors: *Thermal properties, *Clay minerals, *Proteins, *Heat, Measurement, Analytical techniques, Equipment, Data collections, Correlation analysis.
Identifiers: Microcalorimetry.

The heat of reaction during the adsorption of proteins by clay minerals was investigated. All measurements were obtained with a Calvet Microcalorimeter. The sensitivity of this microcalorimeter (plus or minus 0.001 C) required careful evaluation of all experimental procedures used. The colloidal character of the protein (Lysozyme, M.W. 14, 400; Isoelectric Point 11-11.2) and the clay mineral (sodium-smectite) used required adequate mixing in the calorimeter cell to allow complete reaction. The net heat of reaction between Lysozyme (40 mg/ml; 60 mg/ml; 100 mg/ml) and a sodium-smectite was determined. The corresponding heats of dilution of the protein also were measured. (Woodard-USGS)
W74-02669

OPTIMAL CONTROL OF NITROGEN LOSSES FROM LAND DISPOSAL AREAS,
Cornell Univ., Itaca, N.Y.
For primary bibliographic entry see Field 05B.
W74-02677

SOIL TYPE, MOISTURE, TEMPERATURE AND THE LONGEVITY OF A NEMATODE SPECIES OF THE GENUS TYLENCHORHYNCHUS IN THE ABSENCE OF PLANTS,
Macdonald Coll., Montreal (Quebec).
For primary bibliographic entry see Field 02I.
W74-02719

FLOW CHARACTERISTICS OF A SUBSURFACE-CONTROLLED RECHARGE BASIN ON LONG ISLAND, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 04B.
W74-02734

UNSATURATED FLOW PROPERTIES USED TO PREDICT OUTFLOW AND EVAPOTRANSPIRATION FROM A SLOPING LYSIMETER,
Forest Service (USDA), Tempe, Ariz. Forest Hydrology Lab.
For primary bibliographic entry see Field 02D.
W74-02771

MAGNETIC SUSCEPTIBILITY OF THE EXCESS TEMPORARY MOISTENING OF SOILS, (IN RUSSIAN),
Moscow State Univ. Dept. of Soil Melioration.
V. F. Babanin.
Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 4, p 72-77. 1972. Illus. (English summary).
Identifiers: *Magnetic susceptibility, Moistening, *Soils, Solods, Solonetzs, Podzolic soils.

The data on magnetic susceptibility measurements in some soils of temporary over-moistening (solods, solonetzs, and podzolic soils) are discussed. Magnetic susceptibility depends largely on the soil formation process and is not related to bulk Fe content. --Copyright 1973, Biological Abstracts, Inc.
W74-02877

SOME ASPECTS OF CHEMICAL CONTROL OF SOIL-BORNE PATHOGENS,
Plantenziektenkunde Dienst, Wageningen (Netherlands).
For primary bibliographic entry see Field 05B.
W74-02889

SURVEY OF RAIN RUN-OFF HARVESTING,
National Inst. for Water Research, Windhoek (South-West Africa).
For primary bibliographic entry see Field 03B.
W74-02915

LOSS OF NITROGEN FROM VARIOUS NITROGEN FERTILIZERS ON IRRIGATED LAND,
For primary bibliographic entry see Field 03F.
W74-02936

LOWER WISCONSIN RIVER VALLEY SOIL RESOURCES AND USE POTENTIALS,
Wisconsin Univ., Wasusau. Univ. Extension.
For primary bibliographic entry see Field 04A.
W74-02957

FRACTIONATION AND CHARACTERIZATION OF NATURAL ORGANIC MATTER FROM CERTAIN RIVERS AND SOILS BY FREE--FLOW ELECTROPHORESIS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W74-03062

PRESSURE BOMB MEASUREMENTS INDICATE WATER AVAILABILITY IN A SOUTHWESTERN RIPARIAN COMMUNITY,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
C. J. Campbell.
USDA Forest Service Research Note RM-246, August 1973. 4 p, 1 tab, 5 ref.

Descriptors: *Soil moisture, *Riparian plants, Plant physiology, *Moisture stress, *Microclimatology, Microenvironment, *Water loss, Evapotranspiration, Measurement, *Pressure measuring instruments, *Arizona, Deciduous trees, Shrubs, Cacti, Vegetation.
Identifiers: Pressure bomb.

The microclimate of a riparian community was studied in 1970 and 1971 on a one-acre plot at Sycamore Creek near Sunflower, Arizona, occupied by a mixed stand of several deciduous trees, shrubs, and cactus. In spring and summer, soil moisture availability is the most important environmental variable affecting plant moisture stress. The Scholander pressure-bomb technique was used to detect differences in plant moisture stress between and among species, thereby delineating areas of high or low potential evapotranspiration within a riparian zone. (Brown-IPC)
W74-03076

PROPER HYDRATION OF CLAYS FOR ROCK PROPERTY DETERMINATIONS,
Core Lab., Inc., Dallas, Tex.
For primary bibliographic entry see Field 02F.
W74-03153

THE EFFECT OF THINNERS ON THE FABRIC OF CLAY MUDS AND GELS,
Phillips Petroleum Co., Bartlesville, Okla.
For primary bibliographic entry see Field 08G.
W74-03159

EFFECT OF DRYING ON WATER RETENTION OF A PUDDLED SOIL,
Agricultural Research Service, Auburn, Ala. Soil and Water Conservation Research Div.
H. M. Taylor.
Soil Sci Soc Am Proc, Vol 36, No 6, p 972-973, 1972.
Identifiers: *Drying, *Puddled soils, Soils, *Water retention.

Water retention of a silty clay loam soil was increased by puddling. If the puddled samples were dried at 110C prior to testing, water retention at all potentials between -1/5 and -15 bars was similar to nonpuddled soil. If samples were predried to any water potential below the test value, then rewet, their water retention reverted toward that of samples in the non-puddled state.--Copyright 1973, Biological Abstracts, Inc.
W74-03186

2H. Lakes

INVESTIGATION OF A NORTHEASTERN WISCONSIN LAKE ECOSYSTEM: AN INTERDISCIPLINARY APPROACH. PHASE II--MANAGEMENT PROBLEMS AND ALTERNATIVES,
Wisconsin Univ. Center, Marinette.
For primary bibliographic entry see Field 06B.
W74-02662

THE BIOGEOCHEMISTRY OF DEVILS LAKE, NORTH DAKOTA,
North Dakota Univ., Grand Forks. Dept. of Biology; and North Dakota Univ., Grand Forks. Dept. of Geology.
For primary bibliographic entry see Field 05C.
W74-02664

CONTRIBUTION TO KNOWLEDGE ABOUT THE ALGAE (EXCLUDING BACILLARIOPHYCEAE) OF STAGNANT WATERS OF THE IRON GATES OF THE DANUBE,
Academia R. S. R., Cluj. Centrul de Cercetari Biologice.
For primary bibliographic entry see Field 05C.
W74-02699

SURFACE CIRCULATION OF LAKES AND NEARLY LAND-LOCKED SEAS,
Woods Hole Oceanographic Institution, Mass.
K. O. Emery, and G. T. Csanady.
Proceedings of the National Academy of Sciences, Vol 70, No 1, p 93-97, January 1973. 3 fig, 48 ref.

Descriptors: *Water circulation, *Lakes, *Estuaries, *Winds, *Upwelling, *Temperature.
Identifiers: Northern Hemisphere, Surface circulation, Counterclockwise circulation.

The pattern of surface circulation has been mapped for more than 40 lakes, marginal seas, estuaries, and lagoons. All are within the northern hemisphere, and all except one are known to have a counterclockwise pattern. This consistent pattern is attributed to the drag of wind blowing across the bodies of water. Warmer surface water is displaced to the right-hand shore zone (facing downwind), where it produces greater surface turbulence and, thus, greater wind drag. This effect leads to counterclockwise water circulation regardless of the direction and, within limits, the duration of the wind. (Sinha - OEIS)
W74-02715

ELECTRON MICROSCOPIC INVESTIGATION OF NATURAL BACTERIAL POPULATIONS IN THE WATER AND SEDIMENT OF LAKE BALATON AND LAKE BELSO,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
For primary bibliographic entry see Field 05A.

W74-02725

TRACE METALS IN A TUNDRA POND: VARIATIONS IN CONCENTRATION AND THEIR EFFECT ON PHYTOPLANKTON POPULATIONS,
Alaska Univ., College. Inst. of Marine Science.
R. J. Barsdate.
In: Pathways of Trace Elements in Arctic Lake Ecosystems: Progress Report 8 to Atomic Energy Commission, p 3-19, 1972. 4 fig, 4 tab, 9 ref.

Descriptors: *Water analysis, *Trace elements, *Phytoplankton, *Ponds, *Alaska, Arctic, Tundra, Correlation analysis, Chemical analysis, Heavy metals, Analytical techniques, Data collections, Evaluation, Chemical reactions, Ecosystems.
Identifiers: *Barrow (Alaska).

During an investigation of trace metal complexation in arctic waters, high concentrations of copper and lead were found in a small tundra pond occupying a low-centered polygon near Barrow, Alaska. These metal levels appeared anomolous when compared with trace metal data previously compiled for high latitude lakes and ponds. Investigations of the phytoplankton sensitivity to trace metal additions in the pond suggested that the trace metal concentrations observed might affect the pond's phytoplankton population. Trace metal results are presented along with primary productivity, algal biomass, and species composition data. Analytical techniques are described. (See also W74-01401) (Woodard-USGS)
W74-02726

THE INFLUENCE OF DISSOLVED HUMIC SUBSTANCES ON TRACE METAL PHOTOTOXICITY,
Alaska Univ. College. Inst. of Marine Science.
R. J. Barsdate.
In: Pathways of Trace Elements in Arctic Lake Ecosystems: Progress Report to Atomic Energy Commission, p 20-36, 1972. 1 fig, 4 tab, 13 ref.

Descriptors: *Water analysis, *Trace elements, *Organic compounds, *Lakes, *Alaska, Dissolved solids, Correlation analysis, Chemical analysis, Heavy metals, Sampling, Data collections, Evaluation, Arctic, Tundra, Phytoplankton, Chemical reactions, Ecosystems.

Work on the interrelationships between trace metals and biota in high latitude aquatic systems has provided information on rates of metal assimilation, possible changes in metal speciation resulting from biochemical interactions, and the effects of metals on primary producers. Dissolved organic compounds (humic materials) which can complex metals have been found in abundance in some Alaskan lakes, and it is likely that in these lakes the effects of trace metals on plankton algae may be altered substantially by complexation. Water samples were taken from three Alaskan lakes, for which general limnology, trace metal concentration, and organic complexation data previously had been obtained. In lakes with high natural concentrations of humic complexing agents the suppression of phytoplankton production by the addition of trace metals was more pronounced than in a lake with a very low dissolved organic content. The experimental additions of a metal-free humic preparation to lake water naturally low in organics also resulted in an increased sensitivity to metals. These observations suggest that metals complexed by dissolved humic substances are available physiologically to the phytoplankton. (See also W74-01401) (Woodard-USGS)
W74-02727

LAGOON CONTRIBUTIONS TO SEDIMENTS AND WATER OF THE BERING SEA,
Alaska Univ. College. Inst. of Marine Science.
R. J. Barsdate, M. Nebert, and C. P. McRoy.
In: Pathways of Trace Elements in Arctic Lake Ecosystems: Progress Report to Atomic Energy Commission, p 38-71, 1972. 6 fig, 4 tab, 31 ref. AEC Contract AT (45-1)-2229 No 2.

Descriptors: *Water analysis, *Heavy metals, *Lagoons, *Arctic, Sedimentology, Chemical analysis, Sampling, Pondweeds, Correlation analysis, Inflow, Discharge (Water), Oceans, Organic compounds, Sediments, Data collections, Ecosystems, Hydrobiology, Alaska, Tundra, Chemical reactions, Trace elements.
Identifiers: *Bering Sea, Eelgrass.

Izembek Lagoon is an embayment of the Bering Sea at the tip of the Alaska Peninsula and has been the principal site for sea grass community studies in the eastern Bering Sea since 1963. This study of the lagoon suggests that through biogenic modifications the water flowing from the lagoon is as different in many important geochemical parameters as is river water entering the sea from terrestrial sources. The vast eelgrass meadows of the lagoon annually produce 166,000 metric tons of particulate carbon, 7,400 metric tons of nitrogen, 1,660 metric tons of phosphorus, 3.45 metric tons of copper, and 386 metric tons of silica. Only a small fraction of the total production is recycled within the lagoon. In addition to elements incorporated in detached floating eelgrass, the lagoon exports substantial quantities of dissolved carbon, nitrogen, and phosphorus. Dissolved copper and silica, on the other hand, are lost to the lagoon from the Bering Sea at rates which may exceed 200 metric tons of copper per year and 600 metric tons of silica per year. Lead also is removed from the Bering Sea but in somewhat smaller quanitities. The fixed carbon and other elements from sea grasses which eventually are incorporated in the detrital organics of Bering Sea sediments may form an important component of Bering Sea food webs. (See also W74-01401) (Woodard-USGS)
W74-02728

ELECTROCHEMICAL MEASUREMENT OF ZINC IN ORGANIC-RICH WATER,
Alaska Univ. College. Inst. of Marine Science.
R. J. Barsdate.
In: Pathways of Trace Elements in Arctic Lake Ecosystems: Progress Report to Atomic Energy Commission, p 72-85, 1972. 4 fig, 3 tab, 4 ref. AEC Contract AT (45-1)-2229 No 2.

Descriptors: *Water analysis, *Zinc, *Organic compounds, *Lakes, *Arctic, Chemical analysis, Analytical techniques, Electrochemistry, Sampling, Data collections, Chemical reactions, Ecosystems, Alaska, Tundra, Trace elements.

In the organic-rich lakes investigated in the Alaska Arctic region, it appears that a large fraction of the total zinc present is in the form of dissolved complexes or perhaps colloidal complexes, which are not retained on a 0.45 micrometer membrane filter, and that in many cases a smaller fraction is present in simple inorganic forms. Additional small quantities of zinc added as the chloride are distributed between complexed and free zinc without changing the relative abundance of the distribution of zinc-65 between lake water and organic-free solutions separated by dialysis membranes (Barsdate, 1970). Results of electrochemical determinations of zinc in these waters appear to confirm these conclusions, as additions of zinc chloride produce smaller increases in analytically detectable zinc than do similar additions to organic-free media, and the increase in detectable zinc varies linearly with added zinc. (See also W74-01401) (Woodard-USGS)
W74-02729

A MORPHOMETRIC DESCRIPTION OF LAKE ISSYK-KUL' (MORFORMETRICHESKAYA KHARAKTERISTIKA OZERA ISSYK-KUL'),
G. V. Kodyayev.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 105, No 4, p 362-365, July-August 1973. 1 fig, 2 tab.

Descriptors: *Lakes, *Lake morphometry, *Dimensions, *Measurement, Lake shores, Lake basins, Slopes, Curves.
Identifiers: *USSR, *Lake Issyk-Kul', Planimetry, Isobaths.

The length of Lake Issyk-Kul' in northeast Kirgizia (Soviet Central Asia) is 178.0 km. The maximum width of the lake is 60.1 km, and the mean width is 35.0 km. Maximum depth of the lake is 668 m, and mean depth is 278.4 m. The surface area of the lake, determined by planimetry, is 6,236.0 plus or minus 5.6 sq km. The lake volume is 1,738 cu km, and the shoreline length is 688 km. The lake basin is described as a frustum of a cone with an almost flat lower base. Minimum bottom slopes occur on the east and west. The distance from the shore to a depth of 600 m in these regions is 50-60 km, and the bottom slope is about 0 deg 04 min. Maximum slopes occur near the southern shore where they reach 7 deg 30 min. The maximum bottom slope (10 deg 11 min) was measured at the southern shore west of Tamga near Tossor village. The mean water level of the lake in 1968 was 1,607.6 m above sea level. (Josefson-USGS)
W74-02755

ON THE MEAN DRIFT IN LARGE LAKES,
Massachusetts Inst. of Tech., Cambridge.
C. Wunsch.
Limnology and Oceanography, Vol 18, No 5, p 793-795, September 1973. 1 fig, 5 ref. ONR N00014-67-A-0204-0048.

Descriptors: *Lakes, *Water circulation, Limnology, Internal waves, Currents (Water), Winds, Thermal stratification.
Identifiers: *Kelvin waves, *Lake circulation.

Large northern hemisphere lakes show an apparent mean surface drift in the counterclockwise direction. The effect can be explained by the Lagrange dirft induced at second order by internal Kelvin waves. Reversals of the mean drift with depth are predicted. (Knapp-USGS)
W74-02762

A HORIZONTAL DISTRIBUTION OF ORIBATIDS IN EXHAUSTED PEAT-BOGS OF THE BALACHNINSKAYA LOWLAND, (IN RUSSIAN),
Gorkovskii Gosudarstvennyi Pedagogicheskii Institut (USSR).
M. P. Chistyakov.
Ekologiya. Vol 3, No 3, p 53-58. 1972, Illus.
Identifiers: Arboreous cover, Dicranella-Cornicul lata, Distribution, Herbaceous cover, Lowlands, *Oribatids, *Peat bogs, Tectocepheus-Velatus, *USSR (Balachninskaya lowland), *Ticks.

The studied areas of the USSR varied in their herbaceous and arboreous cover. An aggregated distribution of ticks was characteristic of the lots. The degree of aggregation increases with the development of growth upon it. The distribution also depends upon the soil moisture. A high coefficient of correlation existed between Tectocepheus velatus Mich and Dicranella cornicullata.--Copyright 1973, Biological Abstracts, Inc.
W74-02820

A MICROBENTHOS STUDY OF ROTATORIA,
Lund Univ. (Sweden). Limnological Inst.
BrunoBerzins.
Hydrobiologia. 40 (3): 447-452. Illus. 1972. (English summary).
Identifiers: *Benthos, Lakes, Micro-benthos, *Rotatoria, *Sweden (Lake Straken).

In Lake Straken, in southern Sweden, an investigation was carried out on bare sand bottoms, sand bottoms covered with very short Juncus and stone surfaces. All unfixed organisms were sucked up into a sample bottle through a funnel. Only Rotifera were examined quantitatively. The investigation showed that a funnel with a diameter of 3 cm gave quantitatively acceptable results, but when using one with a diameter of 5 cm the central part of the sample area was not completely depleted of organisms. The total number of species was 20:15, and the number of individuals 37:23. The bottom was investigated to a depth of 50 cm. During the whole investigation the weather was completely calm. The numbers from the different depths on bare sand bottoms from sandy bottoms covered with Juncus and from the stone surfaces are presented. The bare sand bottoms were the poorest, probably because the Rotifera there have to migrate long distances horizontally when the water level fluctuates. On stone surfaces the Rotifera fauna was more abundant, probably because when the water level fluctuates the fauna has to migrate only a short distance to find protection. The sample area of 10 x 7 cm from each biotope is sufficient to get an adequate picture of the distribution of Rofifera in a lake. To be able to compare different lakes, however, an enlargement of the sample area would be necessary.--Copyright 1973, Biological Abstracts, Inc.
W74-02893

HIGHER WATER VEGETATION AND ITS FAUNA OF KROTOWAYA LAGA AND KUSGAN LAKES (NORTH KULANDA), (IN RUSSIAN),
Akademiya Nauk SSSR, Novosibirsk. Institut Biologii.
L. L. Sipko, and S. A. Dmitrieva.
Izv Sib Otd Akad Nauk SSSR Ser Biol Med Nauk. 3. 59-62. 1971. (English summary).
Identifiers: Fauna, Lakes, *Lemna-Trisulca, *Phragmites-Communis, *USSR (Kulanda), Vegetation, Aquatic plants, *Productivity.

The productivity of 5 higher water plant species in 2 USSR lakes was determined. The line on numbers and biomass proceeding from the richest fauna Lemna trisculca to the impoverished Phragmites communis is outlined.--Copyright 1973, Biological Abstracts, Inc.
W74-02901

DETERMINATION OF THE HEAT CAPACITY OF LAKE KARIBA,
Rhodes Univ., Grahamstown (South Africa). Dept. of Zoology and Entomology.
K. A. J. King.
South African Journal of Science, Vol 69, No 4, p 119-120, April 1973. 2 fig, 1 tab, 3 ref.

Descriptors: *Heat budget, *Energy budget, *Thermal capacity, *Reservoirs, *Water temperature, Heat balance, Thermocline, Epilimnion, Radiation, Thermal stratification, Lakes.
Identifiers: *Lake Kariba.

The total heat income integrated over the total depth of Lake Kariba was derived graphically from the maximum summer and minimum winter temperatures at various depths and the corresponding area of water at those depths. Compared with lakes elsewhere in the world Lake Kariba has a relatively low heat budget. This is due in part to its comparative shallowness, its depth averaging only 30 m. The thermocline is situated at 20 m for most of the year, the overlying epilimnion storing most of the heat supplied to the lake in summer. The relatively high mean annual temperature of Lake Kariba implies that heat losses from radiation will be correspondingly high. The annual heat income for Basin 5, the portion of the lake with the most reliable hydrological records, was calculated to be 13,100 cal sq cm, equivalent to a retention of only 6.5% of the total heat available. (DWA)
W74-02910

PRELIMINARY REPORT ON SMALL FISHES FROM THE HENDRIK VERWOED DAM, ORANGE RIVER,
J. L. B. Smith Inst. of Ichthyology, Grahamstown (South Africa).
P. B. N. Jackson.
South African Journal of Science, Vol 69, No 3, p 85-87, March 1973. 3 fig, 9 ref.

Descriptors: Aquatic life, Freshwater fish, Fish populations, *Fish reproduction, Spawning.
Identifiers: Hendrik Verwoerd Dam, *Orange River (South Africa).

The first sample of juvenile fish from the Hendrik Verwoerd Dam since its closure was collected on October 4, 1972 using a small seine net. The fish were obtained by only two hauls, one partly ineffective, in about 60 cm of water and comprised 22 Labeo capensis, 86 Labeo umbratus, 1 Cyprinus carpio and 145 Barbus anoplus, the first three being young of large species of commercial importance. The preliminary data support earlier findings on the high reproduction rates and a high survival rate of juveniles of the species studied in a newly impounded lake. (DWA)
W74-02914

STUDIES ON A SALINE LAKE ECOSYSTEM,
Monash Univ., Clayton (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-02920

POLLUTION OF THE 'EL CARPINCHO' POND (PAMPASIC REGION, ARGENTINA) AND ITS EFFECTS ON PLANKTON AND FISH COMMUNITIES,
La Plata Univ. (Argentina). Estacion Hidrobiologica y Acuario de Berisso.
For primary bibliographic entry see Field 05C.
W74-02923

NITROGEN FIXATION IN LAKE SEDIMENTS: A CONTRIBUTION TO NITROGEN BUDGET OF LAKE MENDOTA,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 05C.
W74-02924

PLANKTON DYNAMICS IN A NEWFOUNDLAND LAKE,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-02926

THE OCCURRENCE OF HETEROTROPHIC BACTERIA IN THE WATERS OF THE ILAWA LAKES AND SOME OF THEIR PHYSIOLOGICAL AND BIOCHEMICAL PROPERTIES,
Wyzsza Szkola Rolnicza, Olsztyn-Kortowo (Poland).i. Instytut Inzynierii i Biotechnologii Zywnosci.
For primary bibliographic entry see Field 05C.
W74-02931

ON ENVIRONMENTAL FACTORS OF EEL PONDS: CHEMISTRY OF WATER AND SOIL AND PLANKTON IN MARCH AND JUNE 1967, (IN JAPANESE),
Freshwater Fisheries Research Lab., Tokyo (Japan).
T. Ito, J. Toi, and Y. Satomi.
Bull Freshwater Fish Res Lab Tokyo. Vol 21, No 1, p 15-19. 1971. Illus.
Identifiers: Chemistry, *Eel ponds, *Environmental factors, Plankton, Ponds, Soils, *Zooplankton.

Ecological conditions in an eel pond during the overwintering period (March) and in the feeding period (June) are compared. In March the water pH is most often above 9 and sometimes above 10. Severe burns of the gills and unraveling of the fins which is predominant in March is due to the high pH. Alkalinity and NH4-H content of the water are lower in March than in June. Number of species and individuals of zooplankton is lower in March than in June although the difference is not large.--Copyright 1973, Biological Abstracts, Inc.
W74-02933

ON THE WATER QUALITY OF LAKE BIWA, THE SETA RIVER AND SOME RIVERS IN OTSU CITY AND THE HEAVY METAL CONTENT OF BOTTOM MATTERS OF LAKE BIWA, (IN JAPANESE),
Shiga Univ., Otsu (Japan). Faculty of Education.
For primary bibliographic entry see Field 05B.
W74-02935

LAKE MICHIGAN DISCHARGE STUDIES.
Illinois Inst. for Environmental Quality, Chicago.
For primary bibliographic entry see Field 05B.
W74-02954

THE INFLUENCE OF EUTROPHIC LAKE SEDIMENTS ON THE GROWTH OF DIFFERENT PLANKTONIC ALGAE,
California Univ., Davis. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-02956

THE EFFECT OF PH, C02-CONCENTRATION AND BACTERIA ON THE GROWTH OF THE BLUE-GREEN ALGA OSCILLATORIA REDEKEI VAN GOOR (EINFLUSS VON PH, C02-KONZENTRATION UND BAKTERIEN AUF DAS WACHSIUM DER BLAUALGE OSCILLATORIA REDEKEI VAN GOOR),
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany).
For primary bibliographic entry see Field 05C.
W74-02965

BOTTOM FAUNA CHANGES DURING ARTIFICIAL RESERVOIR DESTRATIFICATION,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
For primary bibliographic entry see Field 05C.
W74-02992

HENNEGUYA SP. (SPOROZOA:MYXOSPORIDA) AS A PROBABLE CAUSE OF DEATH OF ESOX NIGER IN BROME LAKE, QUEBEC,
Noranda Research Centre, Pointe Claire (Quebec).
C. E. Delisle.
Can J Zool. Vol 50, No 11, p 1499-1500. 1972. Illus.
Identifiers: *Canada (Brome Lake-Que.), *Esox-Niger, Gill filament, *Henneguya-Sp, Infection, Lakes, Myxosporida, Sporozoa, Parasites.

Fantham et al. had studied and proposed H. esocis in 1939. Since that time, no other study was carriedout on this subject. The parasite described was also found in Brome Lake (Canada) chain pickerel and caused a gill filament infection as described by Fantham et al. However, the morphology of the parasite is somewhat different than H. esocis and moreover, the infection is serious enough to be the probable cause of death of the hosts. All specimens autopsied were found heavily infected by Henneguya sp.--Copyright 1973, Biological Abstracts, Inc.
W74-03025

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70--PART 6. MISSOURI RIVER BASIN: VOLUME 2. MISSOURI RIVER BASIN FROM WILLISTON, NORTH DAKOTA, TO SIOUX CITY, IOWA.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W74-03035

ACTON LAKE: BIOLOGY OF ITS BENTHOS AND NOTES ON ITS PHYSICAL LIMNOLOGY 1959-1970,
Miami Univ., Oxford, Ohio. Dept. of Zoology.
P. M. Daniel.
Ohio J Sci, Vol 72, No 5, p 241-253, 1972, Illus.
Identifiers: *Benthos, Biology, Biomass, Chemical studies, Lakes, *Limnology, *Ohio (Acton Lake), Stratification, Thermal, Benthic fauna.

Acton Lake is a 253-ha impoundment located in a heavily used state park in south-western Ohio. The length from inflow stream to spillway is 4.3 km, the total shoreline length if 13.9 km, the mean depth is 4.3 m and the maximum depth is 10.4 m. Sediment accumulation averaging 0.023 m annually provides a possible useful life of the lake for recreation of about 140 yr. The lake stratifies chemically and thermally in the summer. Oxygen depletion occurs at the lower depths in the summer. Chironomids are the most numerous component of the macrobenthic fauna of the whole lake and chaoborids are quite abundant in deeper waters. The wet-weight benthic biomass is greatest in late winter before spring emergence. Funnel trapping has yielded a total of 1400 organisms/m for the emergence season from early spring to late fall. Annelids and pelecypods appear to have been increasing in numbers in recent years.--Copyright 1973, Biological Abstracts, Inc.
W74-03066

RESPIRATION AND THERMAL TOLERANCE OF PHYLLOPOD CRUSTACEA TRIOPS LONGICAUDATUS AND THAMNOCEPHALUS PLATYURUS INHABITING DESERT EPHERMERAL PONDS,
California Univ., Riverside. Dept. of Biology.
S. D. Hillyard, and A. Vinegar.
Physiol Zool. Vol 45, No 3, p 189-195. 1972. Illus.
Identifiers: *Crustacea (Phyllopod), Desert, Ephemeral ponds, Larva, *Ponds, *Respiration, Thamnocephalus-Platyurus, *Thermal tolerance, Triops-Longicaudatus.

Oxygen consumption and thermal tolerances ere measured in the phyllopod crustacea T. longicaudatus and T. platyurus inhabiting desert ephemeral ponds in southeastern Arizona and southwestern New Mexico. Measurements were made during consecutive 1-hr exposures to 26, 30, 34, 38, 40, 42 and 44C in order to approximate the continual rise in temperature that occurred in the ponds during the day. Both larvae and adults were used. The mean oxygen consumption of the larvae increased markedly between 26 and 30C, with Q10 values of 4.12 for Triops and 11.81 for Thamnocephalus. Oxygen consumption of the adults increased very little over the temperature span of the experiment. Larvae and adults of each species showed similar thermal tolerances to 1-hr exposures to the experimental temperatures. All of the Triops had died after 1-hr exposure to 42C, while some of the Thamnocephalus survived until 20 min of exposure at 44C. The animals were observed to come to the surface regularly, with their respiratory appendages stirring the top layer of the ponds. For this reason, oxygen levels are probably seldom a limiting factor. The water temperature was never as high as the thermal maxima determined experimentally. Horne (1971), however, recorded a water temperature of 43C in a shallow pond, indicating that lethal temperatures can exist in nature. The near maximal levels of respiration observed in the adults over the range of experimental temperatures and the high Q10 values for oxygen consumption of the inmatures between 26 and 30C are probably related to the rapid growth rate that these animals must sustain in order to become sexually mature and reproduce in the transient ephemeral pond habitat.--Copyright 1973, Biological Abstracts, Inc.
W74-03090

HORIZONTAL PARTICLE VELOCITY PROFILES BENEATH THE CRESTS OF WAVES BREAKING ON A SUBMARINE BAR,
Michigan State Univ., East Lansing. Dept. of Natural Science.
W. L. Wood, Jr.
Available from NTIS as AD-717 365, $3.00 paper copy, $1.45 microfiche. Technical Report No. 3, December 1970. 68 p, 22 fig, 43 ref. Contract ONR N00014-68-A-0109-0002.

Descriptors: *Waves (Water), *Hydrodynamics, Michigan, Coasts, Lakes, *Shallow water, Deformation, *Profiles, Energy, *Lake Michigan.
Identifiers: *Breakers, *Particle velocity, Submarine bars, Near shore, Wave transformation.

The horizontal particle velocity profiles beneath the crests of breaking waves have been measured and evaluated for waves breaking on a submarine bar. A breaking wave classification system based upon the cross-sectional symmetry of the wave was used to isolate three distinct breaker groups. 'Characteristic' wave and horizontal particle velocity profiles were obtained by averaging the wave and velocity profiles from individual waves within each symmetry group. These wave and horizontal particle velocity profiles of the symmetry groups define hydrodynamic conditions for the physical characteristics of the breaking wave. The contrast between the gently spilling symmetric breaker of this study and the plunging symmetric breaker of other investigations may suggest that symmetric waves occur as both high and low energy conditions of a transforming train of irregular waves. (Sinha-OEIS)
W74-03107

WAVE RUNUP, MONO LAKE TESTS, 1965: A SUMMARY OF THEORETICAL PREDICTION METHODS AND SOME COMPARISONS WITH EXPERIMENTAL DATA,
URS Corp., Burlingame, Calif.
J. R. Bertram, and A. R. Kriebel.
Available from NTIS as AD-674 858, $6.00 paper copy, $1.45 microfiche. Reports No. URS-654-5, June 1968. 22 p, 4 fig, 2 tab, 25 ref, append. Nonr-4959 (00).

Descriptors: Coasts, *Beaches, *Waves (Water), *Shallow water, Prediction, Explosions, Hydrodynamics, Lakes, *California.
Identifiers: Mono Lake (Calif), *Wave runup, Shoaling, Underwater explosions.

A literature survey on water-wave runup on sloping beaches is presented along with a comparison of theory and measurements form the 1965 Mono Lake test series. These measurements of runup were about twice as large as predicted because the incident wave height was also about twice as large as predicted. A simplified calculative technique is presented which predicts the measured runup within 10 percent from the wave data measured in deep water. (Sinha - OEIS)
W74-03113

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR MODIFICATION OF A BOAT DOCK AND RAMP.
Renton City Planning Dept., Wash.
For primary bibliographic entry see Field 06G.
W74-03124

EAGLE NEST LAKE: REVISED APPRAISAL.
Lomax and Associates, Albuquerque, N. Mex.
For primary bibliographic entry see Field 06B.
W74-03188

A STATE/LOCAL LAKE REHABILITATION PROGRAM: A PROPOSED BILL AND COMMENTARY,
Wisconsin Univ., Madison. Inland Lake Demonstration Project.
For primary bibliographic entry see Field 05G.
W74-03196

2I. Water in Plants

SIMULATION MODEL FOR EVALUATION OF INTERCEPTION LOSS FROM FOREST TREES, PART I. MODELING SNOW INTERCEPTION ON CONIFERS AND PART II. LABORATORY MODELING OF SNOW INTERCEPTION ON TREES,
Idaho Univ., Moscow. Coll. of Forestry.
G. H. Belt, and M. Molnau.
Available from the National Technical Information Service as PB-226 305 $4.25 in paper copy, $1.45 in microfiche. University of Idaho Water Resources Research Institute Research Technical Completion Report, September 1973. 91 p, 8 fig, 13 tab, 15 ref. OWRR B-009-IDA (1). 14-01-001-1895.

Descriptors: *Interception, *Snow, *Simulation analysis, *Idaho, Model studies, *Coniferous trees.
Identifiers: Sigmoid growth curve.

One portion of the study was conducted to develop models or methods of defining interception storage of snow on conifer trees. Field data obtained in physical modeling of individual trees and data taken from the literature were used to define mathematical relationships and were subsequently incorporated in a computer simulation model for prediction of interception storage by a stand of trees. Comparison of interception storage derived from the stand model with measurements on the model trees indicates reasonable predictive capacity for both individual tree and stand models. Several forms of the sigmoid curve were useful in defining relationships between precipitation, interception storage and the end of storms and vegetational parameters. Surface ratio, related to crown projection area, was a suitable parameter in defining differences in the format of the sigmoid curves. Second portion of the study was conducted to determine the interception characteristics of both artificial and real trees using artificial snow. A drum apparatus was constructed to allow artificial snow to be dropped over the trees. For 3 ft. high artificial troes, the smaller branch angles intercept more snow than larger branch angles in terms of interception over projected areas of the tree. The shape of the interception vs precipitation curve is the same for both real and artificial trees except that the amounts are considerably less for real trees.
W74-02656

VEGETATION OF THE MISSOURI RIVER FLOODPLAIN IN NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Botany.
R. L. Burgess, W. C. Johnson, and W. R. Keammerer.
Available from the National Technical Information Service as PB-226 366 $4.75 in paper copy, $1.45 in microfiche. North Dakota Water Resources Research Institute Report WI-221-018-73, June 1973. 162 p, 61 fig, 12 tab, 179 ref, 2 append. OWRR A-022-N DAK (2).

Descriptors: *Vegetation, *Flood plains, *Missouri River, *North Dakota, *Baseline studies, Environmental effects, Forestry, Engineering structures, Dams, Trees, Growth rates, Reproduction, Plant physiology, Data collections, Soil types, Geology, Climatic data.

An 80-mile-long study area, bordered by Garrison Dam and Oahe Reservoir, includes the only extensive, remaining floodplain forest vegetation in the Missouri Valley in the Dakotas. Data were collected to assess the water relations and nutrient status of each stand, to determine the abundance of plant species, and to examine the behavior of species along environmental gradients. Attainment of the study objectives filled a gap in the knowledge of the forest vegetation of North Dakota. It is now known, in detail, what plant species comprise the forests of the Missouri Valley, how they are arranged into plant communities, the environmental conditions found within each community, and how the meandering nature of the river influences community dynamics and development. This work has provided information regarding the forest habitat used by agricultural Indian tribes less than a century ago. Many of the remaining forests are currently being cleared, selectively cut, and grazed, and it was necessary to collect data from these forests before they, too, disappeared. The construction of dams has eliminated periodic flooding throughout the study area. Data collected during the course of this study indicate that flood protection has led to decreased tree growth and a decline in tree reproduction. (Woodard-USGS)
W74-02667

LITTORAL FAUNA ALONG THE NW COAST OF THE SEA OF JAPAN,
For primary bibliographic entry see Field 02L.
W74-02691

SOIL TYPE, MOISTURE, TEMPERATURE AND THE LONGEVITY OF A NEMATODE SPECIES OF THE GENUS TYLENCHORHYNCHUS IN THE ABSENCE OF PLANTS,
Macdonald Coll., Montreal (Quebec).
I. R. Ogiga, and R. H. Estey.
Phytoprotection. 53 (2/3): 112-116, 1972.
Identifiers: Genus, Longevity, *Nematodes, Plants, *Soil types, Species, Tylenchorhynchus, *Soil moisture, *Soil temperature.

The nematode was found to be viable after 9 mo. in 2 kinds of soil, at various moisture and temperature regimes.--Copyright 1973, Biological Abstracts, Inc.
W74-02719

A STUDY OF EVAPOTRANSPIRATION FROM A DOUGLAS FIR FOREST USING THE ENERGY BALANCE APPROACH,
British Columbia Univ., Vancouver. Dept. of Soil Science.
For primary bibliographic entry see Field 02D.
W74-02764

FOG DRIP FROM ARTIFICIAL LEAVES IN A FOG WIND TUNNEL,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
R. A. Merriam.
Water Resources Research, Vol 9, No 6, p 1591-1598, December 1973. 7 fig, 3 tab, 15 ref.

Descriptors: *Interception, *Water storage, *Fog, *Forests, *Leaves, Water balance, Precipitation (Atmospheric).
Identifiers: Wind tunnels, Fog drip.

The effect of fog intensity and leaf shape on water storage on leaves was studied by using a simple fog wind tunnel and leaves of aluminum and plastic. Test equipment was designed to allow quantification of the chosen variables rather than to duplicate natural conditions. Two intensities of fog were produced, and drip was measured from leaves of five different shapes. Fog intensity effects tended to obscure weaker leaf shape effects in the tests. Drip measurements were reasonably close to values predicted by calculation using an exponential equation based on fog flow and leaf storage capacity. This method of estimating fog drip could be useful when appropriate climatic and vegetative characteristics are known. (Knapp-USGS)
W74-02765

FOREST TRANSPIRATION GREATLY SPEEDS STREAMFLOW RECESSION,
Forest Service (USDA), Durham, N.H. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 02D.
W74-02766

ODONATA OF SUGADAIRA AND VICINITY,
Tokyo Univ. of Education (Japan).
K. Miyakawa, K. Narumi, A. Shimizu, and H. Ando.
Bull Sugadaira Biol Lab. 5 p 1-18. 1972. Illus. English summary.
Identifiers: Agrio-Lanceolatum, *Japan, Lestes-Sponsa, Leucorrhinia-Dubia-Orientalis, Libellula-Quadrimaculata, *Odonata, Somatochlora-Viridianenea, Sympetrum-Frequense, Sympetrum-Infuscatum, Tanypteryx-Pryeri.

This study presents a faunistic record and some ecological nots on Odonata occurring in Sugadaira heights (ca. 1300 m a.s.l. (above sea level)), Nagano Prefecture (Japan) and its surrounding lowland areas, viz, Ueda City, Suzaka City, inclusive of the neighboring highlands, Sampogamine swamp (1860 m a.s.l.). The Odonata of this district are composed of 58 spp., of which 33 are northern or alpine species while 24 are southern or cosmopolitan. The distributionally restricted species may be Somatochlora viridiaenea viridianenea and Agrion lanceolatum of Sugadaira heights, Leucorrhinia dubia orientalis of Sampogamine swamp, Tanypteryx pryeri of Seni at the foot of Sugadaira heights and Aeschna juncea of both Sugadaira and Sampogamine. The larval habitats of the above Odonata species are described briefly. A study on the reproductive behavior of Somatochlora viridiaenea viridianenea in dry places, 3 km apart from the oviposition sites, is discussed. The habitat selection of Sympetrum frequense is discussed. S. infuscatum in highland water areas is recorded. This species is not such a strong migrator as the former. Eggs of Lestes sponsa (25%) collected from Sampogamine Swamp were found to be damaged by a parasitic Hymenoptera. The reproductive behavior of Libellula quadrimaculata asahinai is briefly recorded.--Copyright 1973, Biological Abstracts, Inc.
W74-02783

GEOBOTANICAL PROCESSES IN THE SASKATCHEWAN RIVER DELTA,
Department of Indian Affairs and Northern Development, Ottawa (Ontario). Environmental-Society Program.
H. J. Dirschl.
Can J Earth Sci. Vol 9, No 11, p 1529-1549, 1972. Illus.
Identifiers: *Canada (Saskatchewan River), Deltas, *Geobotanical processes, Gradients, Mats, Moisture, Peat, Rivers, Seasonal, Sedge, Soils, Sphagnum, Spruce, Temperatures, *Vegetation, Water table.

The interactions of substrate, soil frost, groundwater levels, vegetation and ongoing landscape-forming processes were studied in a portion of the Saskatchewan River Delta, Canada. Representative field transects were used to relate vegetation types to differences in relief and seasonal water table elevation. Seasonal soil temperatures were recorded and peat stratigraphy was determined. Vegetation zonations, extending from mixed forest on river levees to open lake water obviously reflect moisture gradients. However, increasing moisture availability is paralled by declining nutrient availability, away from the levees, as peat accumulation prevents rooting in the mineral soil. Nutrient status and type and degree of peat accumulation are thus dependent on landform and water circulation. Three main physiographic divisions were recognized; alluvial levees, open drainage basins, and closed drainage basins. Alluvial levees, paralleling stream channels, are generally well drained, nutrient-rich, and covered by mixed forest and tall shrub communities. Open drainage basins are characterized by slow circulation of mineral waters, favoring growth of minerotrophic fens and floating sedge mats. Closed drainage basins are more or less completely surrounded by raised levees. Their source of water is limited runoff from the encircling levees and precipitation falling onto the basins. Deep peat deposits are characteristic of these sites. Nutrient levels are lower than in open basins and sphagnum moss commonly occurs above the fen peat deposits. The slightly raised centers of these closed basins often support black spruce bog communities.--Copyright 1973, Biological Abstracts, Inc.
W74-02866

DIFFERENTIAL TOLERANCE OF SIX LEGUMINOUS CROPS TO TERBUTRYNE,
Hebrew Univ., Rehovot (Israel). Dept. of Field and Vegetable Crops.
For primary bibliographic entry see Field 03F.
W74-02941

THE SEASONAL GROWTH OF LOVEGRASS (ERAGROSTIS CURVULA) ON DEEP SANDY SOILS IN A SEMI-ARID ENVIRONMENT,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Land Resources Management.
For primary bibliographic entry see Field 03F.
W74-02942

RUSSIAN-THISTLE (SALSOLA) SPECIES IN WESTERN UNITED STATES,
Cincinnati Univ., Ohio. Dept. of Biological Sciences.
For primary bibliographic entry see Field 04A.
W74-02945

TWO NEW SPECIES OF CARYOPHYLLID TAPEWORMS FROM CATOSTOMID FISHES IN TENNESSEE,
State Univ. of New York, Albany. Dept. of Biological Sciences.
J. S. Mackiewicz.
J Parasitol. Vol 58, No 6, p 1075-1081. 1972. Illus.
Identifiers: Biacetabulum-hoffmani, *Catostomid fishes, Hypentelium-etowanum, Isoglaridacris-jonesi, Moxostoma-duquesnei, Moxostoma-erythrurum, New species, *Tapeworms (Caryophyllid) *Tennessee.

Biacetabulum hoffmani is described from Hypentelium etowanum and Moxostoma erythrurum: Isoglaridacris jonesi is from the latter host. B. hoffmani differs from the other 2 nonacetabulate species in the genus by having conspicuous bothria and a disc on the scolex, a short neck, and twice the number of testes. I. jonesi differs from others in the genus primarily by lacking postovarian vitellaria and having weakly developed loculi on the scolex. A discussion of pertinent morphological features, comparisons with related species, and note of intensity and incidence data follow each description.--Copyright 1973, Biological Abstracts, Inc.
W74-02995

PREDATION, PARTICULARLY BY SCULPINS, ON SALMON FRY IN FRESH WATERS OF WASHINGTON,
National Marine Fisheries Service, Seattle, Wash. Northwest Fisheries Center.
B. G. Patten.

Available from the National Technical Information Service as COM-72-10527; $3.00 in paper copy, $1.45 in microfiche. Data Report 71, March 1972. 21 p, 8 fig, 13 tab, 7 ref.

Descriptors: *Predation, *Prey fish, *Fishkill, *Salmon, *Washington, Surveys, Sampling, Fish types, Carnivores, Mortality, Ecosystems, Data collections, Lakes, Streams.
Identifiers: *Pacific salmon.

Stomach contents of 41 species of fish collected in one lake and 11 streams in the State of Washington were examined to determine species that were predaceous on wild and cultured Pacific salmon, Oncorhynchus spp., fry. The only species with salmon in their stomachs were: sculpins, Cottus spp., coho salmon, O. kisutch, chinook salmon, O. tshawytscha, rainbow trout, Salmo gairdneri, and cutthroat trout, S. clarki. Presented are data on the number of salmon in the stomachs of the predators and on body lengths of the predator species. (Woodard-USGS)
W74-03058

ISOGLARIDACRIS AGMINIS SP. N. (CESTODA: CARYOPHYLLAEIDAE) FROM THE LAKE CHUBSUCKER, ERIMYZON SUCETTA (LACEPEDE),
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
E. H. Williams, Jr., and W. A. Rogers.
J Parasitol. Vol 58, No 6, p 1082-1084. 1972, Illus.
Identifiers: Caryophyllaeidae, *Cestoda, Erimyzon-Sucetta, Isoglaridacris-Agminis, Species, *Lake chubsucker.

A caryophyllaeid cestode, I. agminis, is described from the lake chubsucker, E. sucetta. A low number of tests occurring in 1 dorsal and 1 ventral row separates I. agminis from others of the genus. A table comparing the species of Isoglaridacris is presented.--Copyright 1973, Biological Abstracts, Inc.
W74-03097

2J. Erosion and Sedimentation

A FUNCTION FOR SAND MOVEMENT BY WIND,
California Univ. Berkeley. Hydraulic Engineering Lab.
A. A. Kadib.
Available from NTIS as AD-633 841, $6.00 in paper copy. Institute of Engineering Research Technical Report No HEL-2-12, prepared for Army Coastal Engineering Research Center, January 1965. 91 p, 22 fig, 9 tab, 38 ref. DA-49-055-CIV-ENG-63-4.

Descriptors: *Sediment transport, *Wind erosion, *Beach erosion, Coasts, Saltation, Beaches.
Identifiers: Lift force.

A method for calculating the rate of transport was developed. This method was based on experience gained in the field of sediment motion in rivers and all available field and wind tunnel data on the subject. The basic forces causing the sediment motion are those of the average lift L and the fluctuating part L caused by the burbulence. Another factor contribution to the motion in the case of wind is the effect of impact, caused by the particle in saltation, in disturbing the bed surface. The effect of impact was found to be a function of the main forces causing the motion and therefore it was introduced as a correction for the mean lift force caused by the distortion of the fluid field around the bed particles. The basic principles governing the rate of sediment transport by water and air are the same. The only difference was the effect of saltation on disturbing the bed surface in the case of air. The results of this study are represented as a theoretical realtion between the flow intensity and the intensity of sediment load. The effect of particle hidding in the laminar sub-layer was combined with the impact correction to give a final wind correction which proved to be a function of the parameter describing the ratio between the submerged weight of the particle and the mean lift force. The method is applicable for calculating the rate of sand transport under a wide range of wind velocities and for sand sizes ranging from 0.145 mm to 1.00 mm. Application of the derived method for calculating sand transport by wind from natural beaches is given. (Sinha-OEIS)
W74-02689

OBSERVATIONS ON FLOATING BREAKWATERS FOR REFLECTION OF SHALLOW WATER WAVES (RECHERCHES SUR LES BRISE-LAMES FLOTTANTS DESTINES A REFLECHIR LA HOULE EN EAU PEU PROFONDE),
Newcastle Univ. Coll. (Australia).
A. K. Johnston.
La Houille Blanche, Vol 13, No 5, p 540-550, October 1958. 4 fig, 4 ref.

Descriptors: *Beach erosion, *Shore protection, *Breakwaters, Resonance, *Shallow water.
Identifiers: *Floating breakwaters, Wave reflection.

The present study arose from a problem of beach erosion. Since steep waves erode a beach and low camber waves build it up, the possibility of partial reflection of oncoming waves by floating barriers was considered as a means of protection. The objective was to reflect sufficient energy so that waves reaching the shore would be constructive rather than erosive. This problem has been investigated theoretically and experimentally, starting with the premise that to be effective a floating barrier should reflect approximately 50% of the energy of waves of all periods up to 10 seconds. Floating barriers cannot be rigidly restrained and their earlier use has depended simply on their inertia for reflective effect. Practical considerations of barrier size limit inertia reflection to waves of less than about 6 seconds period. To deal with the longer waves the phenomenon of resonance has been employed by making the floating barrier an opened water container of such dimensions that the enclosed water tends to reflect the longer waves by its internal resonance. Two successful designs of floating breakwaters using this combination of inertia and resonance have been developed and tested on a model scale of 1 to 120. Their performance is shown to be an advance on anything hitherto achieved and their possible wider applications for purposes besides beach protection are indicated. (Sinha-OEIS)
W74-02693

THE SOUTHERN MONTEREY BAY LITTORAL CELL: A PRELIMINARY SEDIMENT BUDGET STUDY,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 02L.
W74-02695

INVESTIGATIONS OF MARINE PROCESSES AND COASTAL LANDFORMS NEAR CRESCENT CITY, CALIFORNIA. VOLUME I. TECHNICAL DISCUSSION,
Atmospheric Research Group, Altadena, Calif.
For primary bibliographic entry see Field 02E.
W74-02697

ENERGY MEASUREMENTS IN THE SWASH--SURF ZONE,
University of Southern California, Los Angeles. Dept. of Geology.
For primary bibliographic entry see Field 02E.
W74-02702

COASTAL SAND DUNES OF GUERRERO NEGRO, BAJA CALIFORNIA, MEXICO,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02L.
W74-02704

CRATER-SINK SAND TRANSFER SYSTEM,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 08A.
W74-02705

LONGSHORE TRANSPORT OF SAND,
Scripps Institution of Oceanography, La Jolla, Calif.
D. L. Inman, P. D. Komar, and A. J. Bowen.
In: Proceedings of the Eleventh Conference on Coastal Engineering, p 298-309, 1969. 4 fig, 13 ref. N00014-69-A-0200-6006.

Descriptors: *Sediment transport, Beaches, *Waves (Water), Suspended load, Bed load, Surf.
Identifiers: *Longshore transport.

Simultaneous field measurements of the energy flux of breaking waves and the resulting longshore transport of sand in the surf zone have been made along three beaches and for a variety of wave conditions. The measurements indicate that the longshore transport rate of sand is directly proportional to the longshore component of wave power for fully developed transport conditions; and independent of sand size within the range of about 180 to 600 microns. It is suggested that suspended load transport of sand in the surf zone is less important than bed load transport. (Sinha-OEIS)
W74-02706

A PRELIMINARY INVESTIGATION OF THE RECENT SEDIMENTS OFF THE EAST COAST OF AUSTRALIA,
New South Wales Univ., Kensington (Australia).
F. C. Loughnan, and D. C. Craig.
Australian Journal of Marine and Freshwater Research, Vol 13, No 1, p 48-56, June 1962. 3 fig, 1 tab, 13 ref.

Descriptors: *Sediment transport, *Coasts, *Bottom sediments, Clay minerals, Continental shelf, Marine geology, *Australia.
Identifiers: Differential settling.

Recent sediments from the continental shelf and inner margin of the continental slope for a section of the east Australian coast extending from Sydney to Moreton Island have been examined with respect to composition and particle size distribution. Although insufficient samples are available for conclusive evidence it would appear that there has been very little longshore movement of material and the bulk of the detritus in each sector has been derived from the immediately adjacent land areas. In the Sydney sector there is a suggested variation in clay mineral content with depth which tends to support the differential settling concept. Glauconite, in association with clay pellets, foraminiferal tests, and fine quartz, occurs in goethite and siderite cemented nodules on the continental slope off Port Macquarie and Coff's Harbour. (Sinha - OEIS)
W74-02714

THE EFFECTS OF WATER TABLE AND TIDE CYCLE ON SWASH-BACKWASH SEDIMENT DISTRIBUTION AND BEACH PROFILE DEVELOPMENT,
University of Southern California, Los Angeles. Dept. of Geology.
J. R. Duncan, Jr.
Marine Geology, Vol 2, No 3, p 186-197, November 1964. 7 fig, 4 ref.

Descriptors: *Sedimentation, Beaches, *Tidal effects, Profiles, *Sea level, *Water table, Erosion, Deposition, Surf, *Berms, *California.
Identifiers: Manhattan Beach (Calif), Swash, Backwash.

Fluctuations in sea level relative to beach water table level, resulting from semidiurnal tide cycles, produce appreciable effects on sediment distribution. In the swash-backwash zone, sediment distribution is dependent on the interaction of swash deposition, swash erosion, backwash deposition and backwash erosion. When the tide level is high and the beach water table is low, swash deposition and swash erosion predominate; this results in the formation of a thick sediment lens on the shoreward side of the swash-backwash zone and a scoured area on the surf side of the zone. In contrast, a relatively high water table results in maximum backwash erosion and backwash deposition; thick sediment lenses form near the surf boundary. Therefore, as sea level fluctuates above and below the general water table level with the tide, the zone of deposition correspondingly shifts within the swash-backwash zone and either increases or decreases the gradient of the beach slope. As the tide rises, sediments deposited by previous swashes are redistributed by the encroaching surf. Above the limit of surf encroachment and in the highest swash-mark area, a berm forms, which displays an onlap-offlap series of laminae; also, portions of it are cross-laminated. This berm and its internal structure are a result of sedimentation during the flood-to-ebb tide period. (Sinha - OEIS)
W74-02716

SAND BUDGET FOR CAPITOLA BEACH, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 08B.
W74-02718

RESIDUAL CURRENTS IN RELATION TO SHORELINE EVOLUTION OF THE EAST ANGLIAN COAST,
Leicester Univ. (England). Dept. of Geography.
A. H. W. Robinson.
Marine Geology, Vol 4, No 1, p 57-84, February 1966. 10 fig, 16 ref.

Descriptors: *Coasts, *Shores, *Currents (Water), *Tidal streams, Erosion, *Sediment transport, Hydrography, Sedimentation.
Identifiers: East Anglian Coast, *Wave action, Residual currents, Bottom topography.

The importance of residual currents in fashioning the sea-bed configuration off the East Anglian coast can be assessed from a study of hydrographic data, including marine surveys, current observations and drogue runs. The pattern of banks and channels and the changes to which they are subject, the sediment circulation and the character of the sediments, closely reflect the residual current movements. Not only are tidal streams the most effective physiographic agents offshore but their influence also extends to the coast. Here, in combination with wave action, they can create favorable conditions for sedimentation to take place. The origin of the ness features at Winterton, Caister, Benacre and Thorpeness can be explained in these terms as well as their changing form in response to varying conditions off-shore. There is also an intimate connection between the offshore zone and coast erosion at places like Pakefield, Kessingland and Covehithe since the residual currents offshore are an important factor in determining the supply of sediment to the shoreline and hence the degree of protection afforded by the beach. (Sinha - OEIS)
W74-02720

GEOCHRONOLOGICAL STUDIES IN SANTA BARBARA BASIN: FE-55 AS A UNIQUE TRACER FOR PARTICULATE SETTLING,
Tata Inst. of Fundamental Research, Bombay (India).
S. Krishnaswami, D. Lal, and B. S. Amin.
Limnology and Oceanography, Vol 18, No 5, p 763-770, September 1973. 4 fig, 3 tab, 16 ref.

Descriptors: *Sedimentation rates, *Tracers, *Radioisotopes, Sedimentation, Varves, *California, Iron, Lead radioisotopes.
Identifiers: Santa Barbara Basin (Calif).

The depth distribution of several radionuclides, manmade Fe-55 and naturally occurring Pb-210, and Th isotopes in recent Santa Barbara sediment layers permit an evaluation of the geochemical behavior of Fe, Pb, and Th in coastal waters, and have established the usefulness of Fe-55 and Pb-210 for dating coastal sediments deposited during the last decade and half-century respectively. Sediments accumulate in the Santa Barbara Basin relatively rapidly, about 3-4 mm per yr based on the analysis of varves. These deposits are ideal for studying the applicability of nuclear geochronological techniques in a natural situation. (Knapp-USGS)
W74-02722

MUDFLOW PROPERTIES AND PATTERNS (O SVOYSTVAKH I ZAKONOMERNOSTYAKH SELEVYKH POTOKOV),
M. S. Gagoshidze.
Gidrotekhnika i Melioratsiya, No 5, p 33-39, May 1973. 3 fig.

Descriptors: *Mudflows, *Properties, *Erosion, Mass wasting, Debris avalanches, Landslides, Rockslides, Creep, *Solifuction, Glacial drift, Mountains, Slopes.
Identifiers: USSR.

Mudflow investigations have been carried out at the Georgian Scientific Research Institute of Hydraulic Engineering and Reclamation in Tbilisi since 1930. The concept of a mudflow and common features of mudflow basins are examined, and physicomechanical properties of a mudflow and formation of mudflows as a gradational series of processescharacterized by different proportions of rock, earth, and water are described. (Josefson-USGS)
W74-02750

MINIMIZATION OF POWER EXPENDITURE IN A RIFFLE-POOL ALLUVIAL CHANNEL,
Wisconsin Univ., Milwaukee. Dept. of Geological Sciences.
D. S. Cherkauer.
Water Resources Research, Vol 9, No 6, p 1613-1628, December 1973. 9 fig, 1 tab, 14 ref.

Descriptors: *Alluvial channels, *Channel morphology, *Open channel flow, Geomorphology, Sediment Transport, Sedimentation, Channel erosion.
Identifiers: Italy.

The hypothesis that rivers adjust their flow so as to minimize total power expenditure and to minimize the sums of the variances of power and of other dependent variables was tested with empirical data and a mathematical flow model for a short reach of the Treia River in central Italy. The minimizations are tested by mathematically generating a set of flows that could occur under existing conditions and comparing the pertinent values with those of the modeled real flow. For the limited set of conditions observed (steady base flow over a stable set of riffle-pool bed forms with no movement of sediment) the stream adjusted in the postulated manner. (Knapp-USGS)
W74-02768

THE ROLE OF RAINFALL IMPACT IN SOIL DETACHMENT AND TRANSPORT,
Agricultural Research Service, Morris, Minn. Soil and Water Conservation Research Div.
R. A. Young, and J. L. Wiersma.
Water Resources Research, Vol 9, No 6, p 1629-1636, December 1973. 4 fig, 5 tab, 7 ref.

Descriptors: *Soil erosion, *Impact (Rainfall), *Rill erosion, Sediment transport, Soil surfaces, Hydraulic models, Model studies, Precipitation (Atmospheric), Erosion control.

The relative importance of raindrop impact and flowing water to the erosion process was determined in a laboratory study using three soils--loam, silt loam, and sandy loam--prepared with preformed rills and subjected to simulated rainfall. The source and the mode of transport were determined for all soil detached and transported from the plot under conditions of both normal rainfall energy and greatly reduced rainfall energy. Decreasing rainfall impact energy by 89% without reducing rainfall intensity decreased soil losses by 90% or more, and it was thus indicated that the impact energy of raindrops is the major force initiating soil detachment. For all three soils, 80-85% of the soil loss originating in the area between the rills was transported to a rill before leaving the plot, and it was thus indicated that the transport of detached particles from the plot was accomplished mainly by rill flow. (Knapp-USGS)
W74-02769

AN OVERVIEW OF MARYLAND'S SEDIMENT CONTROL PROGRAM,
Maryland Dept. of Natural Resources, Annapolis. Water Resources Administration.
For primary bibliographic entry see Field 05G.
W74-02852

MUD IN THE NORTH SEA,
University of East Anglia, Norwich (England). School of Environmental Sciences.
I. N. McCave.
In: North Sea Science; Proceedings of NATO North Sea Science Conference, November 15-20, 1971, Aviemore, Scotland: Massachusetts Institute of Technology, p 75-100, 1973. 3 fig, 6 tab, 65 ref.

Descriptors: *Mud, *Sediment transport, *Bottom sediments, Provenance, Path of pollutants, Oceanography, Ocean currents, Tides.
Identifiers: *North Sea.

The origin, transport, and deposition of mud in the North Sea are very poorly known. The major industrial countries of Northwestern Europe discharge high concentrations of pollutants into the North Sea via their rivers. Some of these are already mud, some are initially dissolved but subsequently become absorbed onto mud particles, and some become incorporated into planktonic material which contributes to muddy sediment. The mud deposition rate in sediment traps is about 6 thousand metric tons per sq km per yr at the present time. Areas of sandy mud should have considerably lower deposition rates, possibly of the order of 0.5 thousand tons per sq km per yr. (Knapp-USGS)
W74-03031

SEDIMENT TRANSPORT BY THE NORTH SEA,
National Inst. of Oceanography, Wormley (England).
A. H. Stride.
In: North Sea Science; Proceedings of NATO North Sea Science Conference, November 15-20, 1971, Aviemore, Scotland: Massachusetts Institute of Technology, p 101-130, 1973. 11 fig, 1 tab, 51 ref.

Descriptors: *Sediment transport, *Ocean currents, *Sand waves, Oceanography, Currents (Water), Tides.
Identifiers: *North Sea.

The transport of naturally occurring loose granular materials in open reaches of the North Sea is reviewed so that this information can be used as a guide to what is likely to happen to similar material introduced by man. Sand banks, sand ribbons, and sand waves are valuable bed forms whose presence indicates the importance of sand mobility, and whose shape and orientation indicate the transport direction. Sand transport directions in the sand wave zone are aligned parallel with the coasts of the North Sea. The longest single paths to be inferred are from the vicinity of the bed-load parting located at about 52 deg N as far as the German Bight. (Knapp-USGS)
W74-03032

SEDIMENT DISTRIBUTION IN THE NORTH SEA IN RELATION TO MARINE POLLUTION,
Netherlands Inst. of Oceanography, Texel.
For primary bibliographic entry see Field 05B.
W74-03033

SEDIMENTATION ON THE WESTERN DELTA--FRONT OF THE FRASER RIVER, BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Dept. of Geological Sciences.
For primary bibliographic entry see Field 02L.
W74-03061

ANTIDUNE AND CHUTE AND POOL STRUCTURES IN THE BASE SURGE DEPOSITS OF THE LAACHER SEE AREA, GERMANY,
Ruhr-Universitaet Bochum (West Germany). Inst. of Mineralogy.
H-U. Schmincke, R. V. Fisher, and A. C. Waters.
Sedimentology, Vol 20, No 4, p 553-574, November 1973. 16 fig, 18 ref.

Descriptors: *Sedimentary structures, *Volcanoes, Dunes, Ripple marks, Sediment transport, *Deposition (Sediments), Sedimentation.
Identifiers: *Germany (Laacher See).

Grey tuffs of late Pleistocene age form broad fans radiating from the Laacher See basin, Germany. They were derived from phreatomagmatic outbursts, and transported in turbulent pyroclastic flows, in contrast with the underlying white pumice tuffs of air fall origin. Flow origin of the grey tuffs is inferred from the well bedded plane parallel to cross bedded tephra characteristic of base surge deposits, and a variety of other sedimentary structures, as well as grain size distributions. Most of the cross bedded structures in the Laacher See deposits resemble antidunes, with steep stoss sides and very low dipping lee sides. Upcurrent migration of antidune crests is dominant close to the source, but changes to down current migration at greater distances, presumably because of decay in flow energy. The most spectacular cross bedding is somewhat similar to chute and pool structures formed under experimental conditions in alluvial flumes. These structures formed during deposition from phreatic pyroclastic flows of very high flow energy and high sediment concentration. The antidunes apparently formed at lesser flow velocity than chute and pool structures. The large wave lengths of the dune like structures, however, suggest unusually high velocities. (Knapp-USGS)
W74-03063

INCORPORATION OF URANIUM IN MODERN CORALS,
Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Geology.
For primary bibliographic entry see Field 02K.
W74-03064

FRAGMENTATION OF GRANITIC QUARTZ IN WATER,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Soils.
A. J. Moss, P. H. Walker, and J. Hutka.
Sedimentology, Vol 20, No 4, p 489-511, November 1973. 9 fig, 1 tab, 21 ref.

Descriptors: *Quartz, *Particle size, *Alluvium, *Abrasion, Erosion, Alluvial channels, Sands, Sediment transport, Sedimentology.

Grain fragmentation was studied in a rotating drum to permit the study of all of the debris, and a fragmentation load technique was used to relate experimentally and naturally fragmented material. The investigation was focused on granitic quartz. Relatively gentle collective movement in water can cause significant fragmentation of coarse, nascent, granitic quartz grains. The debris produced by rotating in a drum a range of single sieve fractions, taken from gravel in the headwaters of a stream draining granite, had continuous size distributions down to (and probably beyond) 0.06 micrometers. Quartz was the dominant fragmentation product in all fractions down to 2 micrometers and present in finer fractions. When pebbles moved with sand in these experiments, breakage of the sand was greatly increased. The effect of attrition on granitic quartz was negligible. At least a proportion of granitic quartz grains are subject to a fatigue effect as a result of impacts in water. Granitic quartz is crisscrossed with partially healed cracks acquired before the zone of weathering is reached. The wholesale breakage that affects it, particularly in pebbly streams, is largely due to the reopening of these cracks. Progressive fragmentation of this material must eventually reach a stage wherein grains comprising single original crack-bounded volume elements are produced. Such grains, lacking significant internal weaknesses, must strongly resist further breakage. Possibly the preferential production of quartz grains just below 20 micrometers in size may represent an accumulation of these single, crack-bounded volume elements. (Knapp-USGS)
W74-03065

RESEARCH IN THE COASTAL AND OCEANIC ENVIRONMENT,
Delaware Univ., Newark. Coll. of Marine Studies.
W. S. Gaither, and V. Klemas.
Available from NTIS as AD-752 503, Paper copy $3.00; microfiche. Annual Status Report November 1972. 43 p, 9 fig, 12 fig. ONR Contract N00014-69-A0407.

Descriptors: Delaware, New Jersey, Maryland, Models, *Coasts, *Waves (Water), Beaches, *Sediment transport, *Shallow water, Energy, *Bays, Vegetation, *Remote sensing.
Identifiers: Wave action, *Delaware Bay.

Progress during the third year of a multi-disciplinary study of a section of the Atlantic seacoast (Delaware and adjacent areas of New Jersey and Maryland) is summarized. Models of coastal processes have been developed to aid in the analysis of coastal environments and for use in making precise short-term prediction of coastal change by means of intensive analysis of the near past historic records and sequence of geologic events. Continued theoretical investigations of wave action, model studies of sedimentary processes, and the results of additional observations of vegetative growth and of surface energy exchangees are reported. Two-dimensional optical spectral analysis of shallow water waves is discussed and other remote sensing results are summarized, with emphasis on frontal systems, suspended sediment and flow patterns in and outside Delaware Bay. (Sinha-OEIS)
W74-03096

THE GREAT ATLANTIC COAST TIDES OF 5-8 MARCH 1962,
Princeton Univ. N.J. Dept. of Astronomical Physics.
J. Q. Stewart.
Weatherwise, Vol 15, No 3 p 117-120, June 1962. 5 fig.

Descriptors: Delaware, *Tidal effects, *Storms, *Fetch, *Dunes, Damages, *Beach erosion, *Coastal structures, Atlantic Ocean.
Identifiers: *Breaking waves, Tidal flooding, Bethany Beach (Delaware).

The Great Atlantic Coast tides of March 5-8, 1962, were more damaging to natural coastal features and man-made structures than hurricanes. A slow moving storm having an elongated west to east axis produced a fetch, (probably in excess of 1200 miles). The flow of gales drove along waves of 40 ft or more. This vast movement of wind and water arrived on the Middle Atlantic coast at the time of maximum astronomical tides (perigee spring tides). Surface weather maps at 0700 EST, March 5,6, and 7, 1962 are included. Explanations are given on the significance of fetch, the wave train, the wave energy, and the astronomical high tide which combined to cause unprecedented damage. Air photos of the storm effects at Bethany Beach are included. (Sinha-OEIS)
W74-03099

LITTORAL SEDIMENTARY PROCESSES ON KAUAI, A SUBTROPICAL HIGH ISLAND,
Scripps Institution of Oceanography, La Jolla, Calif.
D. L. Inman, W. R. Gayman, and D. C. Cox.
Pacific Science, Vol 17, No 1, p 106-130, January 1963. 12 fig, 2 tab, 27 ref, append.

Descriptors: *Hawaii, Shallow water, *Beaches, *Climates, *Sediment transport, Islands, Reefs, Shells, Coral.
Identifiers: Volcanic sand, *Kauai (Hawaii).

Beach and shallow water sand samples from Kauai, Hawaiian Islands, were studied to ascertain the effects of climate on the supply of sediment, and of wave action on the dispersal and transport of sand along the shores of this circular island. The littoral sediments of the island are made up of two components; biogenous material, such as shell, coral, and foraminiferal sands, formed near the shoreline; and terrigenous material, consisting mostly of volcanic mineral and rock fragments brought to the beach by rivers. The northeast trade winds play a dominant part in the climatic and oceanographic processes affecting the island. On the windward side of Kauai, the annual rainfall ranges from 30 inches near the coast to over 460 inches at higher elevations; on the leeward side, annual rainfall is less than 20 inches. This large variation in rainfall results in a climatic range from tropic-humid to semi-arid. Rivers draining the wet, windward portion of the island carry relatively little sand, and the shoreline on this side is characterized by intermittent fringing reefs and beaches of calcareous sand. A detailed study of several reefs on the windward side of the island shows that each pair of fringing reefs, divided by a relatively deep inlet, constitute separate cells for the circulation of water and distribution of sediments. The highest concentrations of volcanic sand occur on the lee side of the island, where streams draining the semi-arid region enter the coast. The concentration of volcanic material in the beach sands decreases logarithmically with distance along the coast from the rivers. (Sinha-OEIS)
W74-03102

QUANTITATIVE STUDIES OF BEACH MORPHOLOGY AND BEACH FORMING PROCESSES,
Columbia Univ., New York. Dept. of Geology.
A. N. Strahler, and W. E. Yasso.

vailable from NTIS as AD-608 917, paper copy, .00, microfiche $1.45. Final Report of Project R 388-057, 1964. 17 p, 7 ref. ONR Contract Nonr 6 (68).

escriptors: *Geomorphology, Statistical analy-, *Beaches, *Sedimentation, Tides, Currents /ater), Winds.
entifiers: Spit-bars.

e principal objective was to apply quantitative ethods, including statistical analysis to the olution of beach forms in terms of processes d controlling factors. Experiments have related orphological and structural elements such as ach slope and plan, profile form, and sediment tribution to such dependent variables as wave rameters (height, length, steepness, and rection), tides, currents, and meteorological ele-nts (wind direction and strength). Rates of ach and spit-bar deposition have been measured peatedly along with other variables to determine e nature and causes of changes. Seven reports of ch studies are briefly summarized. (Sinha-OEIS)
74-03104

QUILIBRIUM SHAPES OF COASTLINE IN AN,
ian Inst. of Tech., Bangkok (Thailand).
Vichetpan.
ailable from NTIS as N70-39018, paper copy 00, microfiche $1.45. Master's Thesis No. 280, 59. 52 p, 31 fig, 5 tab, 10 ref.

scriptors: *Bays, Equilibrium, Sediments, /aves (Water), Ocean waves, *Sediment trans-rt, Coasts, *Refraction (Water waves).
ntifiers: *Longshore drift, Shorelines.

stright sedimentary coastline containing adlands, if it suffers persistent waves from an ique direction and no replenishment is provided material removed down coast, will assume a nulate shape which becomes progressively re indented. Finally a shape is reached which is equilibrium with the waves. This occurs when incoming waves break simultaneously around periphery and there is no further longshore ft. The development of such equilibrium shaped vs was studied by means of a model in which ve direction and wave periods were the sole iables. Thus the wave height, water depth, ch height and sedimentary material were the ne throughout. The shape of the bay at various ges from stright line to fully stable was mea-ed after various wave durations. It was found t the major curved portion of the water line was garithmic spiral, the constant of which varied oughout. A consistent pattern was observed for constant for the three wave approach angles 30 degrees, 45 degrees, and 60 degrees and the ee wave periods of 0.6, 1.0, and 1.4 seconds. nha-OEIS)
4-03105

SS TRANSPORT IN WATER WAVES. PART HEORY. PART II. EXPERIMENTS,
ssachusetts Inst. of Tech., Cambridge. Ralph Parsons Lab. for Water Resources and drodynamics.
C. Mei, P. L-F, Liu, and T. G. Carter.
ailable from NTIS as AD-744 005, $3.00 paper py, $1.45 microfiche. Final Report 146, R72-15, pared for Army Coastal Engineering Research nter. April 1972. 290 p, 46 fig, 5 plates, 45 ref, 4 end. DACW 72-68-C-0012.

scriptors: *Waves (Water), *Sediment trans-t, Coasts, Sea walls, *Beaches, *Bed load, ravity waves, Turbulence, Boundary layers.
ntifiers: *Mass transport, Progressive waves, nding waves, Eddy viscosity.

e report describes a coordinated inquiry into h theoretical and experimental aspects of mass nsport by waves. Part I (Theory) begins with a review of the basic assumptions underlying existing theories. General formulas of mass transport velocity components throughout the Stokes boundary layer near a solid body are then derived; details of two examples are calculated. The three-dimensional mass transport distribution throughout the cross section of a wave tank is worked out for progressive waves of very small amplitudes. The effect of finite width is studied with the assumption that vorticity is diffused by molecular viscosity throughout the entire cross section. For a wave obliquely incident and reflected from a vertical sea wall, the structure in the second boundary layer between the Stokes layer and the inviscid core is investigated. This is appropriate for amplitudes much greater than the Stokes layer thickness. Part II (Experiments), was intended in part to check and to evaluate the theoretical deductions in Part I. In particular, extensive measurements were made for the longitudinal mass transport velocity in a progressive wave in a long tank with a smooth bottom. For standing waves and partially standing waves, possible features of erosion and deposition were observed by spreading (1) a small amount of sand on a smooth bottom and (2) a thick layer of sand on the bottom. The relevance of mass transport very near the bottom to the bed load transport is discussed in the light of the real beach environment. (Sinha-OEIS)
W74-03108

COMPUTER SIMULATION OF SHALLOW--WATER MARINE SEDIMENTATION,
Stanford Univ., Calif. Dept. of Geology.
J. W. Harbaugh, and G. Bonham-Carter.
Available from NTIS as AD-672 590, $6.00 paper copy, $1.45 microfiche. Final Report July 1968. 30 p, 4 fig, 5 ref. ONR-N 00014-67-A-0112-0004.

Descriptors: *Refraction (Water waves), *Sedimentation, *Shallow water, *Deltas, Mathematical models, *Simulation analysis, Computer programs, *Beaches, Marine geology, Bibliographies.

Four computer simulation models are discussed. (1) A stochastic delta model employing a constrained random walk technique was found to be unsatisfactory. (2) A deterministic delta model employing a jet velocity field produces a 'delta' narrow in plane view and sloping away from the source at angles less than 1 degree. Incorporation of a feedback regulator permits a 'mouth bar' and 'subaqueous levees' to build. (3) A 'beach' model incorporating wave refraction and turbulent diffusion of sediment is outlined. (4) A simple sedimentary basin model permits experimentation with sedimentation and subsidence rates and dispersal of sediment by wave action. A computerized bibliography on systems and simulation techniques relevant to geology has been set up, and now contains about 500 literature citations, each with keywords. Retrieval on the basis of selection criteria (keywords, title words, author and date) can be carried out using programs developed by the SPIRES system at Stanford. The framework for a general synthesis of simulation techniques as applied to geology, and sedimentation in particular, is laid out. (Sinha-OEIS)
W74-03109

SOURCE AND DISTRIBUTION OF SEDIMENTS AT BRUNSWICK HARBOR AND VICINITY, GEORGIA,
Army Coastal Engineering Research Center, Washington, D.C.
J. Neiheisel.
Available from NTIS as AD-620 873, $3.00 paper copy, $1.45 microfiche. Technical Memorandum No. 12, March 1965. 49 p, 17 fig, 5 tab, 46 ref, 2 append.

Descriptors: *Georgia, *Sediment transport, *Harbors, Coasts, *Beaches, Inlets (Waterways), *Tracers.
Identifiers: *Shoaling, *Heavy minerals, Barrier islands, Hornblende, Wave energy, Brunswick Harbor (Georgia).

The distribution patterns of bottom sediment in Brunswick Harbor and vicinity, Georgia, reflect the long-term hydrodynamic response and generally correlate with dynamic factors affecting sedimentation. Certain diagnostic minerals reflect the source area and are used as 'natural tracers' to delineate direction of sediment movement. Analysis of sedimentary parameters also enables interpretation of direction of sediment transport. The results of this investigation indicate that shaoling presently occurring in Brunswick Harbor is related to materials from a source in the Altamaha River. Sediment contribution to shoaling is introduced into the harbor through the tidal inlet between the barrier islands and from the MacKay River during greater than average discharge rates of the Altamaha River. Shoaling rates in the harbor also correlate with discharge rates of the Altamaha River. This investigation demonstrates the value of sediment interpretation, based on knowledge of regional geology, to provide a basis for analysis of sediment movement in a coastal area. In such a complex coastal area as Brunswick, Georgia, the sediment characteristics augment hydraulic measurements and enable a more complete interpretation of the hydrodynamics involved. Such information has application to engineering design of coastal structures. (Sinha-OEIS)
W74-03110

SEDIMENT TRANSPORT BY WAVES AND CURRENTS,
California Univ., Berkeley. Hydraulic Engineering Lab.
M. M. Abou-Seida.
Available from NTIS as AD-605 158, $6.00 paper copy, $1.45 microfiche. Technical Report No. HEL-2-7, May 1964. 48 p, 15 fig, 2 tab, 35 ref. DA-49-055-CIV-Eng-63-4.

Descriptors: *Sediment transport, *Waves (Water), *Currents (Water), Reviews, Boundary layer.

The first phase of the investigation was a library study of the work done pertaining to the phenomenon of the sand movement due to wave action. This survey provided information on the various techniques and procedures used; it also provided information about the different results obtained concerning the various phases of the study. With this information available, a preliminary laboratory study was carried out to compare the results with the various authors' findings and to check the applicability of the existing proposed methods for predicting the sediment transport due to wave action. The transition from liminar to turbulent boundary layer, turbulent velocity distribution near an oscillating wall, motion of sediment, the case of periodic waves, waves and currents, and sediment transport are described. (Sinha - OEIS)
W74-03111

CORRELATION OF LITTORAL TRANSPORT WITH WAVE ENERGY ALONG SHORES OF NEW YORK AND NEW JERSEY,
Army Coastal Engineering Research Center, Washington, D.C.
J. C. Fairchild.
Available from NTIS as AD-647 213, $6.00 paper copy $1.45 microfiche. Technical Memorandum No. 18, November 1966. 35 p, 12 fig, 3 tab, 14 ref.

Descriptors: *Refraction (Water waves), *Littoral, New York, New Jersey, Coasts, *Beach erosion, *Sediment transport, *Waves (Water), *Shallow water, Atlantic Ocean.
Identifiers: *Wave energy, Barnegat Inlet.

Results are presented of an office study which correlates certain field measurements of net littoral transport with the average net alongshore component of wave energy. It is carried out through a survey attempt toward a useful 'wave energy - littoral transport' correlation for a 500-mile stretch of the North Atlantic Coast by applying wave refraction analysis aided by interpolation techniques to waves hindcast from synoptic weather charts. The littoral transport rates were obtained from beach erosion control and other applicable reports of the study area. The results of the correlation developed between wave energy and littoral transport are presented in tabular and graphical form and compared to other 'wave energy - littoral transport' relationships. The correlation should be reliable within the limits of the data scatter. Near Barnegat Inlet, a nodal zone of littoral transport exists where the net transport rate computed over long periods has been found to approach zero. Material apparently moves away from this shore area, both to the north and to the south, as evidenced by a more consistent erosion pattern here than the intermittent patterns of erosion and accretion for the adjacent shores. There is general agreement among investigators that there is a nodal zone of littoral transport in the Barnegat Inlet area. It is important to note for this area the clear-cut minimum of net alongshore wave energy. In future studies of this nature the wave refraction effects should be considered to the breaker depth for each wave class and not to some arbitrary depth for all classes of waves, as was done in this study. (Kinha - OEIS)
W74-03112

THE OCEAN EDGE OF SAN DIEGO,
San Diego City Planning Dept., Calif.
For primary bibliographic entry see Field 06D.
W74-03120

2K. Chemical Processes

THE MEASUREMENT OF THE HEAT OF REACTION BETWEEN PROTEINS AND CLAY MINERALS BY MICROCALORIMETRY,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
For primary bibliographic entry see Field 02G.
W74-02669

LAGOON CONTRIBUTIONS TO SEDIMENTS AND WATER OF THE BERING SEA,
Alaska Univ. College. Inst. of Marine Science.
For primary bibliographic entry see Field 02H.
W74-02728

ELECTROCHEMICAL MEASUREMENT OF ZINC IN ORGANIC-RICH WATER,
Alaska Univ. College. Inst. of Marine Science.
For primary bibliographic entry see Field 02H.
W74-02729

DETERMINATION OF THE ASSOCIATION AND DISSOCIATION OF HUMIC ACID FRACTIONS BY SMALL ANGLE X-RAY SCATTERING,
Geological Survey, Lakewood, Colo.
R. L. Wershaw, and D. J. Pinckney.
Journal of Research of the U S Geological Survey, Vol 1, No 6, p 701-707, November-December 1973. 6 fig, 1 tab, 28 ref.

Descriptors: *Humic acids, *Water chemistry, *X-ray diffraction, Analytical techniques, Water analysis, Colloids.

A procedure for the fractionation of humic acid samples from different environments involves fractionation of the sample by adsorption chromatography on a Sephadex G-50 column followed by chromatography on either a G-25 or a G-100 column. The fractions of the solutions are then examined by small angle X-ray scattering. Three different types of behavior were detected among the humic acid fractions: (1) some fractions show very little change in aggregation at pH values above 3.5; (2) one fraction forms aggregates at pH values above and below pH 7, but at pH 7 it is completely dissociated; (3) in some fractions the degree of aggregation decreases with increasing pH. However, even at pH values as high as 11.5 some large particles are still present. These differences in association behavior are due to the interaction of different attractive and repulsive forces. In many aggregating systems only one type of attractive force is dominant; however in humic acid systems hydrogen bonding, pi bonding between planar aromatic moieties, and other coulombic interactions apparently all play a role in the formation of molecular aggregates. (Knapp-USGS)
W74-02730

FLUORESCENT SPECTROSCOPY, A TECHNIQUE FOR CHARACTERIZING SURFACE FILMS,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 05A.
W74-02731

KARST WATERS OF THE CAUCASUS (KARSTOVYYE VODY BOL'SHOGO KAVKAZA),
For primary bibliographic entry see Field 02E.
W74-02756

OUTPUT OF PHOSPHORUS, DISSOLVED ORGANIC CARBON, AND FINE PARTICULATE CARBON FROM HUBBARD BROOK WATERSHEDS,
North Carolina State Univ., Raliegh. Dept. of Zoology.
J. E. Hobbie, and G. E. Likens.
Limnology and Oceanography, Vol 18, No 5, p 734-742, September 1973. 2 fig, 3 tab, 22 ref. NSF Grants GB 6742, GB 14289, and GB 14325.

Descriptors: *Nutrients, *Carbon, *Phosphorus, *Cycling nutrients, Sediment yield, New Hampshire, Clear-cutting, Water yield, Demonstration watersheds.
Identifiers: Hubbard Brook Experimental Watershed (NH).

The output of phosphorus, dissolved organic carbon (DOC), and fine particulate organic carbon (FPOC) was measured in two watersheds of the Hubbard Brook Experimental Forest, New Hampshire. One watershed had a cover of birch, beech, and maple; the other had been denuded of trees and regrowth prevented. Concentrations of DOC and dissolved plus fine particulate P changed little with changes in flow. Concentrations of FPOC, however, were strongly dependent on flow and most of the FPOC was exported during a few periods of high runoff. Deforestation caused higher runoff (by 26%), but also greatly increased erosion. Thus, DOC and FPOC output was similar in the two watersheds while the loss of large particulate phosphorus, mostly as inorganic bedload, increased 12 times in the treated watershed. With a rainwater input of 100 g of P per ha, there was an annual net gain of 87 g of P in the undisturbed watershed and a net loss of 104 g of P in the disturbed watershed. In view of the large amounts of phosphorus cycling in the natural forest (some 1,900 g of P per ha in annual leaf fall alone) this ecosystem is strongly conserving phosphorus. (Knapp-USGS)
W74-02759

THE IONIC ACTIVITY FUNCTION OF WATE AND THE ACTIVITY COEFFICIENT OF TH HYDROGEN ION IN SEAWATER,
Sydney Univ. (Australia). Dept. of Physic Chemistry.
For primary bibliographic entry see Field 01B.
W74-02760

MECHANISMS CONTROLLING PORE WATE SALINITIES IN A SALT MARSH,
Florida State Univ., Tallahassee. Dept. Oceanography.
S. E. Lindberg, and R. C. Harriss.
Limnology and Oceanography, Vol 18, No 5, 788-791, September 1973. 3 fig, 1 tab, 11 ref.

Descriptors: *Salinity, *Marshes, *Salt marshe *Pore water, Ion exchange, Adsorption, Mineral gy, Clay minerals.

Mean interstitial salinities in sediments from a sa marsh decrease with depth from a value near th sediment-water interface which reflects near ma ima of bottom water salinities. Density gradient i duced exchange across the interface controls po water salinities near the sediment surface whi response of the fresh groundwater table benea the marsh to varying hydrostatic pressures ov the marsh controls interstitial salinities at dept (Knapp-USGS)
W74-02761

GROUND-WATER BASIC DATA FOR GRIGG AND STEELE COUNTIES, NORTH DAKOTA,
Geological Survey, Bismarck, N.Dak.
For primary bibliographic entry see Field 02F.
W74-02776

CHEMICAL QUALITY OF SURFACE AN SEDIMENT PORE WATER IN LOUISIANA AN MISSISSIPPI ESTUARIES,
Louisiana State Univ., New Oreleans.
For primary bibliographic entry see Field 05A.
W74-02825

THERMAL RADIATIVE PROPERTIES OF SMOOTH AIR-WATER INTERFACE,
Missouri Univ. Rolla. Dept. of Mechanical a Aerospace Engineering.
B. F. Armaly, A. L. Crosbie, D. C. Look, and H. F. Nelson.
International Journal of Heat and Mass Transfe Vol 16, p 1477-1487, 1973, 11 fig, 3 tab, 18 ref.

Descriptors: *Air-water interfaces, *He transfer, *Thermal properties, Water temperatur *Thermal radiation, Mathematics, Heat budg Model studies, Absorption, Temperatur Reflectance.

Thermal radiative properties for an air-water inte face were calculated by considering the interfa to be smooth and the water to be at uniform te perature. Monochromatic hemispherical and n mal reflectance, monochromatic and total norm transmittance, Planck mean and Rosseland me absorption coefficients were evaluated. The wa length interval covered by the calculations w between 0.2 and 200 microns. Other thermal radi tive properties, such as emittance and a sorptance, were related to the above properti and a comparison with available results sho favorable agreement. The use of these properti in the area of remote sensing and global ener balance makes the data essential for identifyi the most effective region of the spectrum and f explaining some of the naturally occurri processes where radiative transfer plays an impo tant role. (Jerome-Vanderbilt)
W74-02874

MPERATURE OF MISSOURI STREAMS,
ological Survey, Washington, D.C. Water sources Div.
E. Bowie.
port prepared in cooperation with Missouri ological Survey and Water Resources, Missouri ter Pollution Board and Environmental Protec- n Agency, 1971. 168 p, 260 tab.

scriptors: *Missouri, *Streams, *Streamflow, emperatures, *Measurement, Water quality, uatic environment, On-site data collections, charge (Water), Seasonal, Diurnal, Instrumen- on, Thermometers, Standards, Water tempera- e.

eam flow temperature and water quality data ich have been collected by the U.S. Geological vey over many years in order to appraise Mis- ri's water resources are presented. All continu- records are summarized and data for all sites have 10 or more occasional temperatures are uded. The time of day date, and stream charges, at the time of day, date the observa- are given as an aid in determining the quality- perature relations in the water. The tempera- data presented were obtained with a sensing be in a flow-through chamber or by immersing ermometer. The accuracy is within a range of 2 rees F. for the ethyl-alcohol actuated thermo- h and plus or minus 5 degrees F for the ther- meters. Records are compiled in a downstream ction. Results indicated that streams in the thern part of the state have higher summer tem- atures and are frozen for longer periods during cold months of the year that streams in the thern part. Data are given for 260 stations. ome-Vanderbilt)
4-02885

DROCHEMICAL INVESTIGATIONS RE- RDING THE RIVER OLT, IN THE SECTION TURNU ROSU PASS, (IN RUMANIAN),
demia R. S. R., Bucharest. Institutul de logie.
etrascu, and I. Hurghisiu.
Cercet Piscic. 30 (3/4): 77-87. 1971. (English mary).
ntifiers: Fish, Hydrochemical studies, River ses, *Romania (River Olt), Section.

chemical composition of Olt (Romania) n's waters, in the section Turnu Rosu pass, ng 1969 was studied. The data obtained show a tive chemical stability of the Olt river's waters. growth and development of fish species are disturbed, the existing conditions being orable to the development of fish culture.-- yright 1973, Biological Abstracts, Inc.
-02903

S OF NITROGEN FROM VARIOUS ROGEN FERTILIZERS ON IRRIGATED ID,
primary bibliographic entry see Field 03F.
-02936

MPUTERIZED DIGITAL DATA ACQUISI- N SYSTEM FOR THERMOGRAVIMETRY SIMILAR APPLICATIONS,
eral Electric Corporate Research and elopment, Schenectady, N.Y.
omeo, E. Lifshin, M. F. Ciccarelli, and D. B. nsen.
lytical Chemistry, Vol 45, No 14, p 2444-2445, ember 1973. 4 fig.

criptors: *Computer programs, *Automatic rol, *Data transmission, Data collections, rication, Programming languages, Electronic pment.
tifiers: *Thermogravimetric analysis, *Data isition, FORTRAN, Digital display.

The data-recording method used in conjunction with continuous thermogravimetric analysis and precision electrobalances usually involves the use of a pen-recorder which can be coupled with an automatic range expander. The pen-recorder usually has a series of shortcomings which prove to be quite inconvenient to correct. As an alternative to the use of pen-recorders, a package has been designed which consits of a digital voltmeter (DVM), an interval timer, an elapsed time clock, and a teletype equipped with a digital data controller. A block diagram and the operation sequence of this digital system are presented. In addition to the application to thermogravimetry, the digital acquisition system can be used for monitoring and recording a variety of phenomena which involve either time-dependent parameters or, in general, up to three independent variables. All system components are commercially available as building blocks. Assembling of the system using commercial modules should be done with minimal design by any competent electronic staff. (Holoman-Battelle)
W74-02977

COMPUTER ANALYSIS OF DATA FROM POTENTIOMETRIC TITRATIONS USING ION--SELECTIVE INDICATOR ELECTRODES,
Hawaii Univ., Honolulu. Dept. of Chemistry.
A. F. Isbell, Jr., R. L. Pecsok, R. H. Davies, and J. H. Purnell.
Analytical Chemistry, Vol 45, No 14, p 2363-2369, December 1973. 3 fig, 3 tab, 24 ref.

Descriptors: *Computer programs, *Data processing, Volumetric analysis, Calibrations, Electrochemistry, Programming languages.
Identifiers: *Ion selective electrodes, *Potentiometric titration, *Data interpretation, *TITRATE, *Electroactive species, Precision, Experimental error, Argentometric titration, Silver electrodes, Analytes, Titrants, Equivalence points.

Although ion-selective electrode potentiometry simplifies end point determinations for many titrations and permits some previously impractical titrations, frequent electrode calibration is necessary. A computer program, TITRATE, has been developed which permits an accurate end-point determination for all titrations in which a few of the data points lie in a concentration region where meaningful potentials can be recorded. This computer technique locates the equivalence point in precipitation and complexation titrations in which either the analyte or titrant is electroactive. TITRATE analyzes only the meaningful data and computes the analyte concentration, the fraction of ideal Nernstian response, and the electrode formal potential. In addition, standard deviations, a comprehensive error analysis, and data which facilitate plotting both sigmoid and linear titration curves are computed. The versatility of ion-selective electrode potentiometry is enhanced by permitting the analysis of ions for which electrodes exist plus species which rapidly from precipitates or complexes with such ions. Examples of three argentometric titrations using a silver ion-selective electrode are presented. For analyses in which speed is a critical factor and electrode calibration is no problem, direct potentiometry is probably the best method of analysis. However, if accuracy rather than speed is critical, electrode calibration is troublesome, or if no ion-selective electrode exists but the unknown rapidly forms a complex or precipitate with an ion for which an electrode exists, then the method described above is ideal. The analysis time is not extreme, and all data analysis is performed by computer. Execution time for the complete analysis of data for one titration is usually between 1 and 2 seconds on an IBM 360/65 computer making the cost for computer time minimal. (Holoman-Battelle)
W74-02978

EVALUATION OF THE FERRIC ION SENSITIVE CHALCOGENIDE GLASS ELECTRODE,
Texas Instruments Inc., Dallas.
For primary bibliographic entry see Field 05A.
W74-02984

WATER RESOURCES OF THE PONCE AREA, PUERTO RICO,
Geological Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 04A.
W74-03038

FRACTIONATION AND CHARACTERIZATION OF NATURAL ORGANIC MATTER FROM CERTAIN RIVERS AND SOILS BY FREE--FLOW ELECTROPHORESIS,
Geological Survey, Washington, D.C.
J. A. Leenheer, and R. L. Malcolm.
GPO, Washington, D.C. 20402 - Price $0.35 (paper cover). Water-Supply Paper 1817-E, 1973. 14 p, 4 fig, 2 tab, 13 ref.

Descriptors: *Organic matter, *Chemical reactions, *Surface waters, *Soils, Correlation analysis, Climates, Chemical analysis, Spectroscopy, Electrophoresis, Carbon, Fulvic acids, Color, Physical properties, Climatic zones, Degradation (Decomposition).
Identifiers: Polysaccharides, *Fractionation.

Soluble river organic matter and soil fulvic acids from a variety of environments were compared by examining the free-flow electrophoretic fractionation curves of organic carbon, color, and polysaccharides. Virtually colorless organic materials were found in both the soil and the river preparations. Polysaccharides comprised 20-75 percent of the colorless material in the soil fulvic acids but only 3.2-7.0 percent of the colorless material in the river preparations. Polysaccharides were complexed with organic materials having negative charges. Amounts of polysaccharides were greater in the Fairbanks soil from Alaska than in the soils from North Carolina or Iowa, and they were greater in the Tahquamenon River in Michigan than in the two rivers in Florida; this suggests that polysaccharide degradation is slower in cooler environments. For all of the organic preparations which were fractionated, the intensity of the yellow color increased as the charge on the organic anion increased. Highly colored, negatively charged organic material was present in greater amounts in the subsurface spodic soil horizon of the Lakewood and Fairbanks soils than in the surface mollic horizon of the Macksburg soil. Infrared spectroscopy and elemental analysis of four pooled fractions of the Fairbanks fulvic acid indicated increasing aromatic character with increasing negative charge. An increase in the carboxyl content with negative charge suggests the carboxyl group as the primary source of the negative charge. (Woodard-USGS)
W74-03062

INCORPORATION OF URANIUM IN MODERN CORALS,
Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Geology.
A. J. Amiel, D. S. Miller, and G. M. Friedman.
Sedimentology, Vol 20, No 4, p 523-528, November 1973. 4 fig, 1 tab, 16 ref.

Descriptors: *Uranium radioisotopes, *Coral, *Chelation, Water chemistry, Calcium carbonate, Reefs, Organic matter.
Identifiers: *Aragonite.

Uranium occurs in corals at three sites: (1) in organic matter; (2) adsorbed on the surfaces of skeletal aragonite; and (3) in the aragonite lattice. Organic matter incorporates from seawater by chelation 40-70 ppm uranium; skeletal aragonite incorporates only 3 ppm. However, as the organic fraction is low (0.1%) its high concentration of

uranium does not significantly affect the total concentration of uranium in the coral. A negligible concentration of uranium, 40-60 ppb, is adsorbed on skeletal aragonite from which it is readily leached or exchanged. This low concentration of adsorbed uranium (less than 2% of the total uranium in skeletal aragonite) is related to the very small specific surface area (1.5-1.8 sq m per g) of the corals. (Knapp-USGS)
W74-03064

FRAGMENTATION OF GRANITIC QUARTZ IN WATER,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Soils.
For primary bibliographic entry see Field 02J.
W74-03065

INFLUENCE OF SOLVATION FACTORS ON ACIDITY. VOLUMES OF IONIZATION OF THE META AND PARA ISOMERS OF NITROPHENOL AND FORMYLPHENOL IN WATER AT 25 DEG,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 01B.
W74-03139

THERMODYNAMICS OF ACID-BASE EQUILIBRIA. III. IONIZATION OF SUBSTITUTED ANILINIUM IONS,
Georgia Inst. of Tech., Atlanta. School of Chemistry.
For primary bibliographic entry see Field 01B.
W74-03140

2L. Estuaries

A MULTI-PURPOSE DATA ACQUISITION SYSTEM FOR INSTRUMENTATION OF THE NEARSHORE ENVIRONMENT,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 07B.
W74-02688

AN ECOLOGICAL STUDY ON THE SO--CALLED MOGAI (ANADARA SUBCRENATA (LISCHKE)) CULTURED IN THE KASAOKA BAY (IN JAPANESE),
Hiroshima Univ. (Japan). Faculty of Fisheries and Animal Husbandry.
For primary bibliographic entry see Field 05C.
W74-02690

LITTORAL FAUNA ALONG THE NW COAST OF THE SEA OF JAPAN,
O. B. Mokiyevskiy.
Available from NTIS as AD-668 592, $6.00 in paper copy. Naval Oceanographic Office, Washington, DC Translation No 341, 1968. 118 p, 9 fig, 49 tab, 32 ref. Trans from Trudy, Institut Okeanologii. Vol 34, 1960.

Descriptors: *Littoral, *Coasts, *Aquatic plants, *Aquatic animals, Hydrography, Aquatic environment, Aquatic habitats, *Marine biology, Climatology.
Identifiers: *Sea of Japan.

Faunal and floral samples were obtained from the littoral and the upper edge of the continental coast of the Sea of Japan, namely between the gulfs z. Pos'yeta and z. De Kastri. The samples were obtained by the Far Eastern Coastal Expedition of the Institute of Oceanology in 1948. The close association of faunal composition, distribution and quantity with the plant world is analysed in detail. In addition, the effects of ground, coastal contours, exposure to waves, and influx of fluvial water are pointed out, comparing various coastal sectors and their flora and fauna. (Sinha-OEIS)
W74-02691

STUDY OF TIME VARIABILITY OF SURFACE CURRENTS AT A POINT IN MONTEREY BAY,
Naval Postgraduate School, Monterey, Calif.
H. M. Howton.
Available from NTIS as AD-756 574, $3.00 in paper copy. MSC thesis, December 1972. 114 p, 46 fig, 2 tab, 17 ref, 3 append.

Descriptors: *Bays, *Currents (Water), *California, *Diurnal, Tides, Winds, Computer programs, *Data collections, *Seasonal.
Identifiers: *Monterey Bay (Calif), Surface currents, Time variability, Coupling, Air-sea interactions.

The geomagnetic electrokinetograph (GEK) was used to measure surface currents near the center of Monterey Bay during six separate 24-hour periods from May through July, 1972. An average of 244 current vectors were derived for each cruise. The mean currents from these cruises are all southerly and ranged from 4.1 cm/sec to 20.4 cm/sec. The average of these mean currents is 12.1 cm/sec toward 163T. These values were compared with individual currents derived from dynamic topographies from the same period. Diurnal and semi-diurnal variations of the current were studied after subjecting the data to a Fourier analysis. It was concluded that there must be at least an indirect coupling of the ocean currents with the semi-diurnal tide at the data point. The diurnal component also is important; it may be tidal or inertial, or merely related to the passage of the sun. (Sinha-OEIS)
W74-02692

THE SOUTHERN MONTEREY BAY LITTORAL CELL: A PRELIMINARY SEDIMENT BUDGET STUDY,
Naval Postgraduate School, Monterey, Calif.
C. E. Dorman.
Available from NTIS as AD-683 662, $6.00 in paper copy. MSC thesis, December 1968. 234 p, 29 fig, 5 tab, 54 ref, 8 append.

Descriptors: *California, *Sediment transport, *Beaches, River flow, Winds, *Waves, Erosion, Seasonal, *Littoral, Bathymetry.
Identifiers: *Monterey Bay (Calif), Surf zone, Near shore, Longshore transport, Mass transport.

A sediment budget was developed for southern Monterey Bay, California. This budget is based upon sediment information obtained from field and laboratory studies. These studies included a detailed quasi-synoptic areal sampling to determine distribution of textural patterns, and a time-series study of beach and surf-zone sand samples obtained from local sand-mining companies. Results were combined with data on river discharge, the wind and wave regimes, and shoreline changes during the past century to develop quantitative estimates of sediment gains and losses to the cell. The major sources of sediment are the discharge from the Salinas River which empties into the northeast corner of the cell, and erosion of Quaternary seacliffs which form the inner bay shore. Major sinks are the Monterey Submarine Canyon, active coastal dune fields, the mining companies, and the offshore area. The recent history of the sediment regime in the southern bay is reviewed, and a forecast of future nearshore changes is made. Recommendations for further work needed to refine the budget computations are presented. (Sinha-OEIS)
W74-02695

WATER WAVE RUN-UP ON A BEACH,
Service Bureau Corp., New York.
For primary bibliographic entry see Field 02E.
W74-02698

HURRICANE SURGE FREQUENCY ESTI- MATED FOR THE GULF COAST OF TEXAS,
Army Coastal Engineering Research Center, Washington, D.C.
B. R. Bodine.
Available from NTIS as AD-684 894, $6.00 in paper copy. Technical Memorandum No. 26 February 1969. 38 p, 18 fig, 2 tab, 5 ref.

Descriptors: *Texas, *Hurricanes, *Storms, Water levels, Winds, Bays, *Flooding, *Coasts, Regression analysis, Frequency, Gulf of Mexico, *Surges, Gulf coastal plains.

Nineteen hurricanes of record since 1900 are used to derive a surge-frequency relationship representative of the entire Texas Coast. Pure statistical methods were not used because of the small number of recorded hurricanes and the lack of recorded data from early storms. The available data are treated by logic and reasoning to derive probable surge frequencies. A method is proposed for assigning frequencies to water levels of hypothetical hurricanes with various prescribed values of hurricane parameters - central pressure index, forward speed, and radius of maximum winds. Also a method is presented for estimating surge frequency in inland bays and adjacent regions subject to flooding by hurricanes. Results are presented in tables and curves. As new data become available, the developed scurves can be refined. (Sinha-OEIS)
W74-02700

COASTAL IMAGERY DATA BANK: INTERI REPORT,
Army Coastal Engineering Research Center, Washington, D.C.
A. Szuwalski.
Available from NTIS as AD-755 508, $3.00 paper copy. Miscellaneous Paper No 3-7 November 1972. 47 p, 8 fig, 1 tab, 4 append.

Descriptors: *Data collections, *Aerial photography, *Coasts, United States, Topography, Maps, Indexing.
Identifiers: *Imagery.

A Coastal Imagery Data Bank will consist of a systematic index identifying available aerial photographs of the coastal areas of the United States. Compilation is scheduled for completion in fiscal year 1977. This interim report covers data compiled through fiscal year 1972. Imagery for the index is compiled by the Defense Mapping Agency Topographic Center. (Sinha-OEIS)
W74-02701

FREE OSCILLATIONS IN THE GULF CIVITAVECCHIA AND THE EFFECT KINETIC VISCOSITY (LE OSCILLAZIO LIBERE DEL GOLFO DI CIVITAVECCHIA L'AZIONE DELLA VISCOSITA CINEMATICA
P. Caloi, and M. C. Spadea.
Annali di Geofisica, Vol 12, No 2, p 161-1 April/May 1959. 2 fig, 1 tab, 8 ref. (English summary).

Descriptors: *Gulf, Ports, *Kinetics, Coas *Shallow water.
Identifiers: Oscillation, Dynamic viscosity, *It (Gulf of Civitavecchai).

The aim of the present work is the study of f oscillations in the Port of Civitavecchia. The application of ordinary thermodynamic theories yielded values shorter than those observed. Th in this particular case, water could not be c sidered an ideal fluid. In view of the modest de of the port (about 14 1/2 feet) and its comparati ly considerable extent, it must be supposed t viscosity influenced the increase of the peri After having considered this aspect of problem, a theory concerning the effect of ki matic viscosity was applied yielding excell results. A theoretical value (T ± 10m, 8) coincid

with the average observed was obtained for the uninodal of the gulf. The lengthening of the period which would take place in the case of an ideal fluid has turned out corresponding to the action of dynamic viscosity for which v ± 840 c.g.s. was obtained. (Sinhas-OEIS)
W74-02703

COASTAL SAND DUNES OF GUERRERO NEGRO, BAJA CALIFORNIA, MEXICO,
Scripps Institution of Oceanography, La Jolla, Calif.
D. L. Inman, G. C. Ewing, and J. B. Corliss.
Geological Society of America Bulletin, Vol 77, p 787-802, August 1966. 7 fig, 5 tab, 23 ref, 4 plates. Nonr-2216 (23).

Descriptors: *Coasts, Mexico, Wind velocity, *Waves (Water), *Dunes, Shores, *Sediment transport, Climates.
Identifiers: *Mexico (Baja California), Barrier beaches.

A dune field of uniform 6-m high barchan ridges, about 40 square km in area, has blown inland from a barrier beach and has formed a partition of sand across the lagoon. The partition connects the barrier beach with the Baja California mainland. During 3.5 years of observation, the dunes advanced with a mean velocity of 18 m/year. This is equivalent to a discharge of 23 cu m of sand/m width/year. This discharge acting over the 1800-year life of the barrier beach, as dated by Carbon-14, is shown to be compatible with total volume of sand required to extend the dune field across the lagoon to the mainland. Observed travel rate of dunes was about twice that predicted from wind measurements. During high water accompanying spring tides, the floor of the interdune areas is inundated by water from the lagoons; thus, the windward margins of the dunes are subjected to the action of small waves generated by wind. The waves form miniature barrier beaches that are preserved as the dune migrates and serve as fortnightly and monthly time markers in the sediments. Avalanche bedding is the most common small-scale internal structure in the dune field. Gently sloping laminations associated with wind-blown ripples and with wave swash on the miniature barrier beaches are also common. (Sinha-OEIS)
W74-02704

TIDAL CURRENT SURVEYS BY PHOTOGRAMMETRIC METHODS,
Coast and Geodetic Survey, Washington, D.C.
M. Keller.
Technical Bulletin No 22, October 1963. 20 p, 10 fig, 5 tab, 13 ref, 3 charts.

Descriptors: *Surveys, *Coasts, *Photogrammetry, Water circulation, Meteorology, Bays, Harbors, Hydrologic data, *Tides, *Currents (Water), Photography, Data reduction.
Identifiers: Tidal currents.

Photogrammetric methods can provide accurate surface current measurements of large current velocities as well as smaller velocities down to 0.1 or 0.2 knot. Photogrammetry can provide synoptic measurements of a large area and thereby obtain more detailed circulatory information than is feasible otherwise. For the preparation of a current chart, photogrammetric measurements must be made in conjunction with current meter readings for proper reduction of the photogrammetric data. The data obtained from long periods of meter observation permit the removal of eccentricity introduced into the instantaneous photogrammetric observations by meteorological disturbances and the prediction of current velocities at future times. The Coast and Geodetic Survey plans to apply photogrammetry to current surveys as a production operation in the future whenever more detailed information is needed than can be readily obtained by conventional methods. (Sinha-OEIS)
W74-02707

WAVE INDUCED OSCILLATIONS IN HARBORS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
F. Raichlen, and A. T. Ippen.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 91, No HY 2, Proceedings paper 4241, p 1-26, March 1965. 14 fig, 1 tab, 17 ref, 1 append.

Descriptors: *Harbors, *Waves (Water), Energy, Resonance, Model studies.
Identifiers: *Wave energy, Coupling, Geometry, *Oscillations (Waves).

Of primary interest in this investigation are the wave-induced oscillations of a small rectangular harbor that is connected to a larger rectangular wave basin. This simple model system, devoid of any form of artificial energy dissipators, was studied experimentally and theoretically to determine with what degree of accuracy the arrangement could predict the resonant modes of oscillation of a similar harbor connected to the open sea. The effects of energy dissipators on the harbor response characteristics are examined briefly. Because of the high degree of coupling between the small rectangular harbor and its attendant wave basin, the response characteristics of the model harbor as a function of incident wave period were radically different from a similar prototype harbor connected to the open-sea. The effect of geometry and wave length in such a system makes the use of this type of model unrealistic for the investigation of resonance. Efficient wave absorbers and wave filters in the main basin are necessary to reduce this coupling effect. (Sinha-OEIS)
W74-02708

SEA LEVEL AS AFFECTED BY RIVER RUNOFF, EASTERN UNITED STATES,
Geological Survey, Woods Hole, Mass.
For primary bibliographic entry see Field 02E.
W74-02709

SEA WAVES IN COASTAL WATERS OF THE BRITISH ISLES,
M. Darbyshire.
Deutsche Hydrographische Zeitschrift, Vol 15, No 6, p 256-264, December 1962. 9 fig, 9 ref.

Descriptors: *Coasts, *Waves (Water), Winds, *Shallow water, *Fetch, *Ocean waves, Bays.
Identifiers: British Isles, Irish Sea.

Wave records obtained from the Smith's Knoll and Morecambe Bay light vessels are used to obtain relationships between wind speed and wave height and period in shallow water conditions for various lengths of fetch. Spectra obtained from data from the Smith's Knoll, Morecambe Bay and Seven Stones light vessels are presented. The spectrum formula for shallow water is found to be identical with that for deep water, found previously, with the same modifications for short fetch conditions. Relationships between wind and speed and wave height and wave period have been established for shallow water conditions. These are found to be substantially different to similar relationships for deep water conditions. The shallow water spectrum, however, is identical with that for deep water except in the case of the Irish Sea where there is some distortion of the spectrum shape. This may be due to the occurrence of both deep and shallow water in close proximity in this sea. (Sinha-OEIS)
W74-02710

DEFORMATION OF TEMPORAL PATTERN OF ORBITAL WAVE VELOCITY AND SEDIMENT TRANSPORT IN SHOALING WATER, IN BREAKER ZONE AND ON FORESHORE,
Tokyo Univ. (Japan). Geophysical Inst.
Y. Nagata.
The Journal of the Oceanographical Society of Japan, Vol 20, No 2, p 57-70, June 1964. 15 fig, 2 tab, 3 ref.

Descriptors: *Sediment transport, *Beaches, Profiles, Sands, *Waves (Water), *Shallow water, Bottom sediment.
Identifiers: Suspended sediments, *Breaker zone, Orbital wave velocity, *Japan coast, Temporal pattern, Nearshore processes, Surf zone, Foreshore.

The horizontal velocities of orbital wave motion were measured by electromagnetic current meters. The deformations of temporal patterns of orbital wave velocity are discussed in respect to two typical beaches of gentle slope and steep slope. The results are examined together with the data on suspended sediments. A simple model on the mechanism of the balance of sediment transport in a cross-section perpendicular to shoreline is proposed and an explanation is given to account for the occurrence of coarse sands along steeply sloping beach and fine sands along gradually sloping beach. (Sinha-OEIS)
W74-02711

SURFACE CIRCULATION OF LAKES AND NEARLY LAND-LOCKED SEAS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 02H.
W74-02715

PARTITIONING OF THE ESTUARINE ENVIRONMENT BY TWO SPECIES OF CANCER,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
H. P. Jeffries.
Ecology, Vol 47, No 3, p 477-481, Spring 1966. 5 fig, 1 tab, 20 ref. PHS Grant WP-0023 and WP-00858.

Descriptors: *Rhode Island, *Crabs, *Bays, *Morphology, Temperature, Bottom sediments, *Estuarine environment, Habitats.
Identifiers: *Narragansett Bay (R.I.), Cancer irroratus, Cancer borealis.

There is little mixing of Cancer irroratus and C. borealis populations in Narragansett Bay, R.I. Cancer irroratus is found on sand, and C. borealis occurs in areas of coarse gravel and mixed rocky debris. The morphology, walking ability and serum of these crabs were examined to explain their separation in the bay. Walking ability was measured in a rotating jug. Cancer irroratus was at least five times more active and had a higher optimum temperature for walking than C. borealis. The optimum temperature for walking corresponded with distribution of both species on the east coast of North America: C. irroratus is most common in temperate waters, whereas C. borealis is a more northern, colder-water species. Cancer irroratus also had high concentrations of serum phosphate, which may be associated with its activity in nature. The concentrations of glucose, total nitrogen and chloride were the same in both species, presumably because their growth rates were similar and the salinity in both habitats was the same. Thus, C. irroratus is adapted for life on a flat, sand bottom where survival must depend upon an ability to run, catch food and escape from predators. C. borealis leads a reclusive life, hiding in crevices and relying upon its heavy claws for protection. Spatial partitioning of the bottom by Cancer is compared to temporal partitioning in the plankton by two species of Acartia. Competition within these groups might help to stabilize estuarine production. (Sinha - OEIS)
W74-02717

THE ADSORPTION OF RHODAMINE-B ON TO MATERIALS CARRIED IN SUSPENSION BY INSHORE WATERS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab.
For primary bibliographic entry see Field 05B.
W74-02721

DISPOSAL OF BRINE INTO AN ESTUARY,
Camp, Dresser and McKee, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 05B.
W74-02735

CHEMICAL QUALITY OF SURFACE AND SEDIMENT PORE WATER IN LOUISIANA AND MISSISSIPPI ESTUARIES,
Louisiana State Univ., New Oreleans.
For primary bibliographic entry see Field 05A.
W74-02825

BAYLANDS SALT WATER FLOOD CONTROL PLANNING STUDY.
For primary bibliographic entry see Field 04A.
W74-02829

A STUDY OF COMMERCIALLY IMPORTANT ESTUARINE-DEPENDENT INDUSTRIAL FISHES,
Louisiana Wild Life and Fisheries Commission, New Orleans.
For primary bibliographic entry see Field 06C.
W74-02839

AN ANNUAL PLANKTON CYCLE ON THE CHESAPEAKE BAY IN THE VICINITY OF CALVERT CLIFFS, MARYLAND, JUNE 1969 - MAY, 1970,
Academy of Natural Sciences of Philadelphia, Pa. Dept. of Limnology; and Academy of Natural Sciences of Philadelphia, Benedict Md. Benedict Estuarine Lab.
For primary bibliographic entry see Field 05C.
W74-02863

CHARACTERISTICS OF STEAM ELECTRIC CONDENSER COOLING WATERS,
Johns Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 05B.
W74-02869

A STATEMENT PREPARED FOR SUBMISSION AT THE PUBLIC HEARING ON APPLICATION MADE BY BALTIMORE GAS AND ELECTRIC COMPANY FOR A PERMIT TO APPROPRIATE AND USE SURFACE WATER FOR OPERATION OF THE CALVERT CLIFFS NUCLEAR POWER PLANT MADE TO THE MARYLAND DEPARTMENT OF WATER RESOURCES,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05C.
W74-02886

CHESAPEAKE BAY MODEL STUDY FOR CALVERT CLIFFS,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
For primary bibliographic entry see Field 05B.
W74-02905

THE MOVEMENT AND IMPACT OF PESTICIDES USED FOR VECTOR CONTROL ON THE AQUATIC ENVIRONMENT IN THE NORTHEASTERN UNITED STATES,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05B.
W74-02948

PHYTONEUSTON ECOLOGY OF A TEMPERATE MARINE LAGOON,
American Univ., Beirut (Lebanon). Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-02985

PACIFIC SALMON AQUACULTURE PROGRAM--INCUBATION AND CULTIVATION PHASES,
Ocean Systems, Inc., Reston, Va.
J. M. Lindbergh.
Available from NTIS, Springfield, Va 22151 as COM-73-10566, Price $3.00 printed copy; $1.45 microfiche. Sea Grant Final Report, 1973. 57 p, 45 fig, 6 tab. USDC Sea Grant 208-1043-71 (G).

Descriptors: *Fisheries, *Salmon, *Fish reproduction, *Washington, Estuarine fisheries, Freshwater, Anadromous fish, Commercial fishing, Fish management, Pan fish, Fish stocking, Fish hatcheries, Reproduction.
Identifiers: *Pacific salmon aquaculture program, *Puget Sound (Wash).

A project to demonstrate the feasibility of raising marketable pan-size salmon on a commercial scale in Puget Sound, Washington is described. A total of 211,000 salmon were successfully raised from eggs to an average marketable 12-inch size (approximately 340 grams) in 14 months using floating net pens. The following phases of the operation are described: incubation of eggs, freshwater cultivation in ponds, saltwater cultivation in net pens, stimulation of public awareness, and environmental monitoring. (Woodard-USGS)
W74-03028

OCCURRENCE AND BEHAVIOUR OF HEAVY METALS IN RIVER DELTAS, WITH SPECIAL REFERENCE TO THE RHINE AND EMS RIVERS,
Institute for Soil Fertility, Groningen (Netherlands).
For primary bibliographic entry see Field 05B.
W74-03034

MANAGING OUR COASTAL ZONE.
For primary bibliographic entry see Field 05G.
W74-03037

COOPERATIVE INVESTIGATION OF THE CARIBBEAN AND ADJACENT REGIONS (CICAR), VOLUME II, BIBLIOGRAPHY ON MARINE BIOLOGY.
Franklin Inst. Research Labs., Philadelphia, Pa.

NOAA, National Oceanographic Data Center Publication, Rockville, Md, August 1972. 243 p.

Descriptors: *Bibliographies, *Marine biology, *Gulf of Mexico, Continental shelf, South America, Oceans, Sediments, Stratigraphy, Geomorphology, Marine algae, Marine animals, Ecosystems, Marine bacteria, Marine fish, Marine microorganisms, Marine plants, Information retrieval, Publications, Indexing.
Identifiers: Caribbean Sea, *Greater and Lesser Antilles, Central America.

This volume includes an extensive compilation of literature on the marine biology of the Caribbean Sea, Gulf of Mexico, Greater and Lesser Antilles regions, and the adjacent areas of North, Central, and South America. All references appear chronologically and are alphabetized by author within year. Each entry is numbered consecutively starting with II-0001 and ending with II-3496. In the citation, periodic publications are abbreviated through the use of CODEN, the most extensive and widely used system for abbreviating journal references. CODEN is a five-character code designating the title of a specific serial publication. A glossary gives CODEN abbreviations used. A subject matter index, an author index, and a geographic index are included. (See also W74-03055) (Woodard-USGS)
W74-03054

COOPERATIVE INVESTIGATION OF THE CARIBBEAN AND ADJACENT REGIONS (CICAR), VOLUME III, BIBLIOGRAPHY ON MARINE GEOLOGY AND GEOPHYSICS.
Franklin Inst. Research Labs., Philadelphia, Pa.

NOAA, National Oceanographic Data Center Publication, Rockville, Md, August 1972. 238 p.

Descriptors: *Bibliographies, *Marine biology, *Gulf of Mexico, Continental shelf, South America, Oceans, Sediments, Stratigraphy, Geomorphology, Marine algae, Marine animals, Ecosystems, Marine bacteria, Marine fish, Marine microorganisms, Marine plants, Indexing, Publications, Information retrieval.
Identifiers: *Caribbean Sea, *Greater and Lesser Antilles, Central America.

This volume includes an extensive compilation of published literature on the marine geology and geophysics of the Caribbean Sea, Gulf of Mexico, Greater and Lesser Antilles regions, and the adjacent areas of North, Central, and South America. All references appear chronologically and are alphabetized by author within year. Each entry is numbered consecutively starting with III-0001 and ending with III-3280. In the citation, periodic publications are abbreviated through the use of CODEN, the most extensive and widely used system for abbreviating journal references. CODEN is a five-character code designating the title of a specific serial publication. A glossary gives CODEN abbreviations used. A subject matter index, an author index, and a geographic index are included. (See also W74-03054) (Woodard-USGS)
W74-03055

LARVAL FISH SURVEY OF HUMBOLDT BAY, CALIFORNIA,
National Marine Fisheries Service, Tiburon, Calif. Tiburon Fisheries Lab.
M. B. Eldridge, and C. F. Bryan.
For sale by GPO, Washington, D.C. 20402 - Price $0.25. National Oceanic and Atmospheric Administration Technical Report NMFS SSRF-665, December 1972. 8 p, 8 fig, 1 tab, 21 ref.

Descriptors: Fish, *Larvae, *Bays, *California, Surveys, Fish eggs, Bottom sampling, Sampling, Methodology, Nets, Fish types.
Identifiers: *Larval fish survey, *Humboldt Bay (Calif), *Fish species.

As part of a series of investigations of the marine resources of Humboldt Bay, Calif., a larval fish survey was conducted from January to December 1969. Bottom and oblique tows were made at five sampling stations with 1-m plankton nets on alternate biweekly intervals. Thirty-seven species of larval and juvenile fishes representing 17 families were collected. In terms of larval abundance, the dominant fish was the bay goby, Lepidogobius lepidus, followed by Pacific herring (Clupea harengus pallasi), Pacific staghorn sculpin (Leptocottus armatus), longfin smelt (Spirinchus thaleichthys), and the arrow goby (Clevelandia ios). These five species constituted 95% of all larvae captured. The number of larvae captured increased with increasing distance from the mouth of the Bay. The lowest number of species captured was at a station which experienced the widest range of salinities and temperatures. Peaks of seasonal abundance occurred in January and February and in April and May. Relatively few fish were captured after June. Some notable appearances of offshore spawned fishes occurred in Humboldt Bay. (Woodard-USGS)
W74-03059

CHECKLIST OF PUGET SOUND FISHES,
Washington Univ., Seattle. Div. of Marine Resources.
A. C. DeLacy, B. S. Miller, and S. F. Borton.
NTIS, Springfield, Va 22151 as COM-73-10072 - Price $3.00 printed copy; $1.45 microfiche. Washington University Sea Grant Program Publication WSG 72-3, July 1972. 43 p, 1 fig, 182 ref.

Descriptors: *Fish types, *Fish populations, *Sounds, *Washington, Reviews, Indexing, Bibliographies, Publications, Documentation, Classification.
Identifiers: *Fish species, *Puget Sound (Wash), Fish distribution.

A list of fishes constitutes a compilation of data on Puget Sound, Washington, fish species distribution up to 1971. It is compiled from literature from unpublished cataloged entries in the University of Washington collection of fishes, unpublished log records from the University of Washington College of Fisheries, University of Washington Department of Oceanography, University of Washington Friday Harbor Laboratories, Washington State Department of Fisheries, National Marine Fisheries Service, Municipality of Metropolitan Seattle, and other sources. Included is a bibliography, in alphabetical order by author, containing 182 related reports. (Woodard-USGS)
W74-03060

SEDIMENTATION ON THE WESTERN DELTA--FRONT OF THE FRASER RIVER, BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Dept. of Geological Sciences.
J. L. Luternauer, and J. W. Murray.
Canadian Journal of Earth Sciences, Vol 10, No 11, p 1642-1663, 1973. 12 fig, 4 tab, 19 ref.

Descriptors: *Sedimentation, *Deltas, *Canada, *Erosion, Sediment transport, Alluvium, Sedimentary structures.
Identifiers: *Fraser River.

Sedimentation and erosion on the western delta-front of the Fraser River, Canada are described on the basis of a detailed sedimentological survey and three successive bathymetric surveys. The surveyed portion of the delta-front can be subdivided into three sedimentary environments: salt marsh, main platform, and upper foreslope. The salt marsh lies near high tide level and is a flat to hummocky, vegetated zone about 1 km wide, having sediments with a mean grain size finer than 0.063 mm. The main platform slopes gradually for about 6 km from the salt marsh to the break in slope at approximately 9 m below lowest normal tide level. It is mantled mainly with 0.35 mm to 0.125 mm rippled sand. The upper foreslope extends from the main platform to the limit of the bathymetric survey. The gradient of the upper foreslope is variable and attains a maximum inclination of approximately 12 deg. Upper foreslope sediments are muddy at and north of the main river channel, but consist mostly of sand south of there. The sharp transition between platform sand and muddy foreslope sediment north of the main channel suggests that the -9 m contour there is the maximum depth of vigorous wave and current action. As a consequence of local physical oceanography and confinement and dredging of the main channel, yearly freshet deposition is promoting the advance of the delta-front principally off the main channel and is sufficient to maintain the stability of the upper foreslope north of there. However, on the southern-most segment of the western delta-front, prevailing conditions have brought about the retreat of the upper foreslope during the period 1968-1972. (Knapp-USGS)
W74-03061

A HYDROLOGIC RECONNAISSANCE OF THE PASCAGOULA RIVER ESTUARY, MISSISSIPPI,
Geological Survey, Jackson, Miss.
D. E. Shattles.
Available from the National Technical Information Service as PB-226 570 $3.50 in paper copy; $1.45 in microfiche. Supplemental publication to the 8th Mississippi Water Resources Conference Proceedings, April 10-11, 1973, Vicksburg: Mississippi State University Water Resources Research Institute, 1973. 30 p, 25 fig. OWRR A-999-Miss (9a).

Descriptors: *Hydrologic data, *Water quality, *Estuaries, *Mississippi, Data collections, Channel morphology, Tidal waters, Tidal effects, Saline water intrusion, Streamflow, Tidal streams, Water level fluctuations, Surveys, Planning, Water resources development, Waste disposal, Recreation facilities, Navigation, Water supply, Hydrographs, Water pollution sources.
Identifiers: *Pascagoula estuary (Miss).

Increasingly, attention is centered on estuaries in Mississippi. These tidal reaches have tremendous potential for recreation, waste disposal, navigation, and water supply. Data are presented from an investigation of the Pascagoula estuary made by the U.S. Geological Survey in the late summer of 1972 in cooperation with the Pat Harrison Waterway District. The estuary extends inland about 42 river miles. Bottom profiles of the main channels of the Escatawpa, East Pascagoula, West Pascagoula, and Pascagoula Rivers were made using a recording fathometer. Tide gages were installed to determine the range in tide in the estuary, to determine times of low and high tides, and to assist in estimating how far upstream tides affect the water-surface elevation under average conditions. The degree of saltwater intrusion upstream depends principally upon freshwater discharge, tidal stage, and configuration of the river channel. The natural water quality of the Pascagoula estuary is very good. Freshwater inflow into the estuary is characterized by low concentrations of dissolved material and related substances. The high quality of water in the estuary is greatly reduced by municipal wastes, wastes from various wood products and wood-chemical plants, fish processing plants, chemical plants, and shipbuilding industries. (Woodard-USGS)
W74-03094

FIRST EXPERIMENTAL RESULTS ON THE DIFFUSION OF FRESH WATER IN A SHALLOW BAY,
Ente Nazionale per l'Energia Elettrica, Rome (Italy).
M. Pagliari.
Air and Water Pollution, International Journal, Vol 10, No 8, p 537-548, August 1966. 12 fig, 2 tab, 19 ref.

Descriptors: *Estuaries, *Bays, *Mixing, *Diffusion, Shallow water, Currents (Water), Waves (Water), Freshwater, River flow, Sea water.
Identifiers: Italian Coast, *Tyrrhenian Sea.

The Studies and Research Division of ENEL (Ente Nazionale per l'Energia Elettrica) in 1965 initiated experimental research on the diffusion of river water into the sea, under physically and topographically common conditions along the Italian coast; i.e. in shallow bays, where weak currents and small tide heights prevail. The experimental area was the Garigliano River and the Gaeta Bay, in the Tyrrhenian Sea between Rome and Naples. The general pattern of current was determined by launching a number of floats into the river, just upstream from the mouth, followed by a small boat, to ascertain their path and scattering. At several predetermined points water was sampled, in depths of 0.2, 1 and 2 m, as well as the sea bed; sea-bed samples were also taken. Water samples were analysed for their chlorinity, hardness, electrical conductivity and refractive index. Iso-haline and iso-hardness curves and profiles were drawn, showing a definite mixing pattern. Calculations were made for salt-wedge and the resultant freshwater depth at the river mouth; the diffusion of fresh water in the sea was also calculated by using the Pritchard continuous source formula. Theoretical and experimental values are in fairly good agreement with each other, but more experimental results are needed. (Sinha-OEIS)
W74-03100

PROCESSES CONTRIBUTING TO THE NUTRIENT DISTRIBUTIONS OFF THE COLUMBIA RIVER AND STRAIT OF JUAN DE FUCA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-03101

SOURCE AND DISTRIBUTION OF SEDIMENTS AT BRUNSWICK HARBOR AND VICINITY, GEORGIA,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02J.
W74-03110

A STUDY OF WATER CIRCULATION IN MONTEREY HARBOR USING RHODAMINE B DYE,
Naval Postgraduate School, Monterey, Calif.
F. Breidenstein, and D. M. Thomas.
Available from NTIS as AD-618 881, $6.00 paper copy, $1.45 microfiche. MSC thesis, 1965. 66 p, 20 fig, 4 ref.

Descriptors: *California, *Dye dispersion, *Water circulation, *Harbors, Rhodamine, *Tidal effects, Tracers.
Identifiers: Monterey Harbor (Calif.), *Tidal currents, Wind driven currents.

Rhodamine B dye was used to determine water circulation in Monterey Harbor. Point and line dye sources were traced visually, photographically, and by use of a fluorometer. The spreading of dye boundaries and the concentrations observed are presented in a time series of synoptic charts for each of the four surveys conducted. From these measurements, mean flow rates and a dye diffusion rate were determined. Circulation was found to be dominated by tidal currents, but wind-driven currents were important in the outer harbor. In the outer harbor, the circulation proved to be counterclockwise during rising tide, and clockwise during the falling tide. Flow was minimal in the inner harbor, or marina. Limited data indicate that the subsurface circulation agreed with the surface circulation in most of the surveys. (Sinha - OEIS)
W74-03114

CALCULATION OF A SOLITARY WAVE SHOALING ON A SHALLOW SLOPE,
URS Corp., Burlingame, Calif.
For primary bibliographic entry see Field 08B.
W74-03115

CLEARWATER COASTAL ZONE MANAGEMENT PLAN.
RMBR Planning/Design Group, Tampa, Fla.

Prepared for Coastal Coordinating Council, Tallahassee, Fla. (1973). 66 p, 28 fig.

Descriptors: *Coasts, *Seashores, *Coastal marshes, *Florida, Shores, Beaches, Coastal structures, Zoning, Runoff, Storm runoff, Ecology, Gulf of Mexico.
Identifiers: *Coastal management, Clearwater (Florida), Tampa Bay, Environmental impact statements.

The objective of coastal zone management is to enable more environmentally conscious decisions to be made regarding use of coastal lands, including immediately adjacent lands having direct and

significant impacts on coastal waters. A pilot study for municipal level management was sponsored by the Florida Coastal Coordinating Council. Existing municipal objectives and proposed policies pertinent to management of Clearwater's two coastal zones (1) on Clearwater Harbor and the Gulf of Mexico and (2) on Old Tampa Bay were collected for evaluation in terms of environmental and urban impacts. Charts were used to facilitate systematic analysis. Data relevant to coastal zone development were collected, including existing land uses, circulation and drainage patterns, aquatic conditions, and completed projects and their observed impacts. After identifying problems and opportunities discovered in the analysis phase and developing supplemental objectives for shoreline management, a coastal land utilization plan and a shoreline management plan are developed. Actions, roles, and standards are recommended. An explicit amendment to the city's zoning ordinance, pertaining to waters and waterfront property is offered. The city is urged to formalize requirements for environmental impact statements; the study offers a checklist of relevant questions. Engineering considerations to minimize stormwater runoff are presented. (Stein - North Carolina)
W74-03116

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

DYNAMICS REVERSE OSMOSIS MEMBRANES OF ULTRATHIN DISCS,
Department of the Interior, Washington, D.C. (Assignee).
W. M. King.
U. S. Patent No 3,764,526, 7 p, 5 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 639, October 9, 1973.

Descriptors: *Patents, *Reverse osmosis, *Desalination, Cellulose acetate, *Water purification, Sea water, Potable water, *Membranes, Separation techniques.
Identifiers: Ultrathin membrane discs.

Dynamic membranes can be formed from suspensions of ultrathin membrane discs which are in themselves tiny reverse osmosis membranes. Ultrathin membrane discs may be prepared from a solution of a conventional membrane material such as cellulose acetate by spraying the solution at controlled conditions onto an appropriate casting surface. Numerous droplets are formed on the casting surface and the evaporation of the solvent from these droplets forms the membranes. After appropriate post casting treatments a dilute suspension of these membrane discs can be prepared and used in the formation of dynamic reverse osmosisi membranes. (Sinha-OEIS)
W74-03009

MGCO3 ADDITION TO CASO4 CONTAINING SEA WATER TO PREVENT CORROSION,
H. Tabata, N. Tabata, and R. Nakajima.
U. S. Patent No 3,766,019, 6 p, 5 fig, 3 tab, 12 ref; Official Gazette of the United States, Vol 915, No 3, p 1018, October 16, 1973.

Descriptors: *Patents, *Desalination, *Flash distillation, *Evaporators, *Corrosion control, Chemical reactions, Sea water, Fresh water, Water treatment, Magnesium carbonate, Calcium sulfate, Calcium carbonate.

A process is described for evaporating sea water with almost complete avoidance of corrosion of the steel materials on the flash evaporation apparatus. Magnesium carbonate is added to the sea water in an amount to react calcium sulfate dissolved in the sea water to such an extent that 5 to 10 percent of the original Ca++ remains dissolved in solution while forming a calcium carbonate precipitate. The precipitate is removed by filtration. The pH of the treated sea water is adjusted with a mineral acid to pH5.0 to 5.5. The treated sea water is deaerated at a rate exceeding 90 percent. The sea water is introduced into a stage of a flash evaporation apparatus in which the temperature is lower than 80 deg C. (Sinha-OEIS)
W74-03010

ELECTROLYTIC CELL FOR ELECTROLYSIS OF SEA WATER,
Daiki Engineering Co. Ltd., Tokyo (Japan). (assignee)
T. Itakura, T. Shoda, and T. Yamamoto.
U. S. Patent No. 3,766,045, 3 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 3, p 1024, October 16, 1973.

Descriptors: *Patents, *Desalination, Sea water, Potable water, *Electrolysis, *Water treatment, *Scaling, Electrolytes.

An electrolytic cell for direct electrolysis of sea water is described. The cathode plates are parallelly elongated upward and downward longer than the anode plates to prevent Mg (OH)2 from adhering to the cathode plates and further prevent impurities from depositing in the cell to increase the efficiency of the electrolysis. The cell includes a feed chamber below the electrolysis chamber, and an electrolyte takeoff-precipitate withdrawal chamber directly above the electrolysis chamber, with the outlet port from the electrolysis chamber coincident with the inlet port to the electrolyte takeoff-precipitate removal chamber. (Sinha-OEIS)
W74-03011

SUN TREATS COOLING WATER WITHOUT CHROMATES FOR CORROSION PROTECTION,
Sun Oil Co., Philadelphia, Pa.
For primary bibliographic entry see Field 08G.
W74-03160

3B. Water Yield Improvement

ALL-UNION CONFERENCE ON USE AND CONSERVATION OF WATER RESOURCES (VSESOYUZNOYE SOVESHCHANIYE PO ISPOL'ZOVANIYU I OKHRANE VODNYKH RESURSOV),
For primary bibliographic entry see Field 06B.
W74-02748

WATER MANAGEMENT IN FINLAND (VODNOYE KHOZYAYSTVO FINLYANDII),
Politekhnicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 06B.
W74-02754

EVAPORATION RETARDATION BY MONOLAYERS,
California Univ., Berkeley. Dept. of Mechanical Engineering.
R. Greif.
Water Resources Research, Vol 9, No 6, p 1679-1680, December 1973. 6 ref. NSF Grant GI-34932.

Descriptors: *Monomolecular films, *Evaporation control, Convection, Hexadecanol, Hydrodynamics, Evaporation, Water vapor.
Identifiers: Hydrodynamic conductance.

The reduction in the rate of evaporation of water by hexadecanol monolayers is analyzed by considering the hydrodynamic boundary layer conductance and the vaporization step conductance (related to the migration of water molecules from the liquid water phase into the vapor phase). A value of 0.95 cm/sec was found for the vaporization step conductance. (Knapp-USGS)
W74-02774

WATER-USE BY RIPARIAN VEGETATION AT CATHEDRAL PEAK,
U. W. Nanni.
South African Forestry Journal No 80, p 1-10, March 1972. 9 fig, 2 tab, 9 ref.

Descriptors: *Demonstration watersheds, *Water loss, *Riparian water loss, *Water yield improvement, Streamflow, *Low flow, *Weirs, Base flow, Evaporation, Water vapor, Transpiration, Water utilization.
Identifiers: *South Africa, Portable weirs, *Vapor loss.

Two portable weir tanks fitted with a water-level recorder to measure flow up to 19 cubic meters per hour through a V-notch were installed in series 330 meters apart in the Gogodo Stream at the Cathedral Peak Forest Influence Research Station in the summer rainfall region of South Africa. After the streamflow had been gauged at both weirs for 14 days, most of the riparian scrub forest between the weirs was removed in one afternoon in August, the time of most stable base flow which coincides with the period when riparian vegetation starts to grow actively and to transpire strongly. The catchment above the weir, and neighboring catchments, served as controls against which to judge the changes in daily vapor loss and run-off induced by removal of riparian vegetation between the two weirs. Although statistical tests showed significant differences between the treated portion of the catchments and the controls, and non-significant differences between the controls, not all the conditions on which the tests were based were fulfilled and the results were therefore presented in graphical form only. The experiment showed that the use of small portable weir tanks is practicable and that the small increase of about 12 liters in daily run-off for every meter of streambank vegetation removed, is detectable. (DWA)
W74-02912

SURVEY OF RAIN RUN-OFF HARVESTING,
National Inst. for Water Research, Windhoek (South-West Africa).
D. H. R. Hellwig.
South African Journal of Science, Vol 69, No 3, p 77-78, March 1973. 15 ref.

Descriptors: *Water harvesting, *Water yield improvement, *Soil sealants, *Soil stabilization, Surface run-off, Asphalt, Bituminous materials, Plastics.
Identifiers: Water repellents.

Various means of rendering the soil surface impervious so as to increase run-off are reviewed and compared on the basis of their cost, ease of construction, efficiency and durability. They include the use of galvanized iron, asphalt, concrete and bituminous surfaces, water repellents, soil stabilizing agents, plastic sprays and sheeting, butyl rubber sheeting,and combinations of materials such as aluminum foil cemented to the underlying soil with asphalt. (DWA)
W74-02915

WEATHER MODIFICATION OPERATIONS IN CALIFORNIA, OCTOBER 1, 1968 - SEPTEMBER 30, 1969,
California State Dept. of Water Resources, Sacramento. Div. of Resources Development.
E. C. Greiner, and J. B. Powers.
State of Calif, Documents Section, P.O. Box 20191, Sacramento, Calif 95820 - Price $1.00. Bulletin No 16-69, June 1970. 14 p, 2 plate.

Descriptors: *Weather modification, *Cloud seeding, *Silver iodide, *California, Data collections, Artificial precipitation, Climatology, Cloud physics, Streamflow forecasting.

Within the reporting period, October 1, 1968, through September 30, 1969, nine licensees conducted 11 weather modification projects in California. During this period, all projects except fog dispersal projects dispersed some form of silver iodide (AgI) as the only nucleating agent. The fog dispersal projects used finely ground sodium chloride (NaCl) as the nucleating agent. The data are summarized. Days of cloud seeding reported are the days on which seeding operations took place. Seeding did not necessarily occur during all hours of the day. Because of heavy rains in January and February, many of the projects shut down ahead of schedule. (Woodard-USGS)
W74-03056

DESIGNING FOR FUTURE EXPANSION--DEVELOPMENT OF GROUND WATER IN INDIA,
Uttar Pradesh Irrigation Dept., Lucknow (India).
For primary bibliographic entry see Field 04B.
W74-03151

3C. Use of Water of Impaired Quality

POWER PLANT EFFLUENT - THERMAL POLLUTION OR ENERGY AT A BARGAIN PRICE,
Westinghouse Research Lab., Pittsburgh, Pa.
For primary bibliographic entry see Field 05B.
W74-02888

3D. Conservation in Domestic and Municipal Use

MODEL FOR LANDSCAPE RESOURCE ASSESSMENT, PART I OF THE 'METROPOLITAN LANDSCAPE PLANNING MODEL' (METLAND),
Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional Planning.
For primary bibliographic entry see Field 06B.
W74-02657

WATER-WORKS IN CITIES OF SPECIFIED CLASSES OF POPULATIONS.
For primary bibliographic entry see Field 06E.
W74-02802

BAYLANDS SALT WATER FLOOD CONTROL PLANNING STUDY.
For primary bibliographic entry see Field 04A.
W74-02829

REGIONAL WASTEWATER DEVELOPMENT PLAN, WATER QUALITY PLANNING.
Alamo Area Council of Governments, San Antonio, Tex.
For primary bibliographic entry see Field 05D.
W74-02830

SAN DIEGO'S OFFSHORE AREA,
San Diego City Planning Dept., Calif.
For primary bibliographic entry see Field 06F.
W74-02831

COMPREHENSIVE WATER AND SEWER STUDY, HAMILTON, WALKER, AND CATOOSA COUNTIES, (BOOK TWO).
Hensley-Schmidt, Inc., Chattanooga, Tenn.
For primary bibliographic entry see Field 05D.
W74-02833

EVALUATION OF ALTERNATES FOR WATER POLLUTION CONTROL AND RESOURCE MANAGEMENT: PHASE III, POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY, ANNEX C.
Boyle Engineering, Las Vegas, Nev.; and Cornell, Howland, Hayes and Merryfield, Las Vegas, Nev.
For primary bibliographic entry see Field 05D.
W74-02834

PUBLIC POLICY ALTERNATIVES AFFECTING WATER AND SEWER SERVICE IN URBAN GROWTH AREAS.,
North Carolina Univ., Chapel Hill.
K. B. Kenney.
Master's thesis 1964, 227 p, 1 fig, 7 tab, 264 ref.

Descriptors: *Planning, *Water supply, *Sewerage, Land use, Municipal water, Regulation, Groundwater, Urbanization, Cities.
Identifiers: Utility extension, Public policies, Public control.

State government influence on the provision of water and sewer service has been of considerable importance although many states have been slow in realizing their central role in assisting local government. Federal financial assistance has had a strong stimulating effect on the installation of public water and sewer services. The removal of the Federal tax advantage enjoyed by local government bonds would work against these programs and local investment in utilities. The city can regulate the geographical sequence of development in some degree by the policies it adopts concerning the extension of services. Municipalities whose practices are examined include Washington, D.C. and its Maryland suburbs, Baltimore, Bridgeport, the North Carolina Research Triangle, Denver, Grand Rapids, and others. Also explored in detail are the policies of Greensboro, Winston-Salem, Durham, and Raleigh in North Carolina, noting contrasts and similarities in policies and their effects on urban development. Policies in all four seem to have been designed to encourage compact development, although Greensboro has probed further. Basic contention is that public control of groundwater, and of public water supply, and of waste water disposal practices would give more complete control of urban development and that it may represent a strong tool for effectuation of desired patterns of urban growth. (Edwards - North Carolina)
W74-02835

NORTH CAROLINA WATER PLAN PROGRESS REPORT: CHAPTER 19: POWER AND WATER.
North Carolina State Dept. of Water and Air Resources, Raleigh.

Draft Report, November, 1970. 142 p, 18 plates, 128 ref, 5 append. Title III P. L. 89-90, WRP Act.

Descriptors: *Power plants, *Water resources development, *North Carolina, Hydroelectric plants, Thermal power plants, Nuclear power plants, *Planning, Water resources, Cooling.
Identifiers: *Power plant sites, Siting.

Mechanical, conventional hydro-electric, pumped-storage hydro-electric, and thermal power from both fossil and nuclear sources are the five methods of power development which entail utilization of water resources. This volume surveys development of water-related power in North Carolina, identifies considerations for siting of future power plants, and recommends state actions relevant to power plant siting. The roles of federal and state agencies active in power generation and distribution in North Carolina are discussed. Existing power plants and their generating capacities are identified. General service areas of private power companies are mapped. Potential sites for power plants are located and the conclusion is drawn that thermal sources will supply most of the state's future power need. Suitable water supplies for cooling are the greatest problem related to thermal plant siting. Other items for consideration in siting are foundation conditions, earthquake likelihood, tornadoes, hurricanes, and floods. It is recommended that (1) the State strengthen its long-range planning, giving special attention to the North Carolina Water Plan, (2) a power plant siting law be enacted, coordinated by the State Utilities Commission, (3) the siting law should specify agencies advirsory to the coordinating body, (4) the siting law specify that recommendations of advisory agencies be conclusive in matters where existing law places on them a regulatory authority, and (5) that the State Planning Division should study need and develop form of a state land-use plan. (Stein - North Carolina)
W74-02836

COMPREHENSIVE REGIONAL WATER AND SEWER SYSTEMS INVENTORY AND ANALYSIS,
Alabama-Tombigbee Rivers Regional Planning and Development Commission, Camden.
For primary bibliographic entry see Field 06B.
W74-02837

HILLSBOROUGH COUNTY, FLORIDA: POPULATION PROJECTIONS AND ENVIRONMENTAL FACTORS.
Hillsborough County Planning Commission, Tampa, Fla.
For primary bibliographic entry see Field 06D.
W74-02838

SOLIDS WASTE DISPOSAL.
Montgomery County Sanitary Dept., Dayton, Ohio.
For primary bibliographic entry see Field 05D.
W74-02840

WATER QUALITY MANAGEMENT PLAN FOR THE GREEN AND CEDAR RIVER BASINS IN THE STATE OF WASHINGTON: PROGRESS REPORT FOR FISCAL YEAR ENDING JUNE 30, 1972.
Stevens, Thompson and Runyan, Inc., Portland, Oreg.
For primary bibliographic entry see Field 05D.
W74-02842

SUMMARY OF THE SOUTHERN TIER EAST REGIONAL PLAN, BROOME AND TIOGA COUNTIES, NEW YORK.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-02844

PLANNING FOR WATER RESUE,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05D.
W74-02845

THE MUSKEGON COUNTY PLAN OF WASTE WATER REUSE.
For primary bibliographic entry see Field 05D.
W74-02846

DIVERSION OF FLOOD FLOWS FROM THE CONNECTICUT RIVER AND THE EFFECT ON GROUNDWATER SUPPLIES,
Massachusetts Univ., Amherst. Dept. of Geology.
For primary bibliographic entry see Field 04B.
W74-02847

THE LIQUID WASTE FACILITIES FUNCTION CONCEPT.
Charlotte, N.C. USAC Project.

For primary bibliographic entry see Field 05D.
W74-03039

FUNCTIONAL WATER AND SEWER REPORT,
Colorado School of Mines, Golden.
D. Whitney, and H. Swanson.
Prepared for Larimer and Weld Regional Planning Commission, Greeley, Colorado. April, 1973. 47 p, 2 fig, 4 maps, 5 tab, 2 append. HUD 701.

Descriptors: *Water supply, *Sewerage, *Project planning, Planning, Urbanization, Cost analysis, Financing, Sewers, *Colorado.
Identifiers: A-95 Review, Areawide planning, *Capital improvements, Fort Collins (Colo).

Several applications for functional water and sewer planning and programming certification by the U.S. Department of Housing and Urban Development are discussed. Under the A-95 review program the Larimer-Weld Regional Planning Commission reviews all local projects for water and sewer improvements that require federal assistance. The review is based on comprehensive plans and planning guides for the two-county region. At present, two applications have been certified by HUD; these are the Estes Park Basin Plan and the Fort Collins-Boxelder Program. Various elements of a Functional Water and Sewer Plan for the Urbanizing Portion of the Region are presented. These include plans for Fort Collins for water and sewer, capital improvements for Loveland, and capital expenses for Greeley. Specific project requests are ordered in terms of priority and include a description and location of the project, its cost, financing, timetable for completion, and justification. (Elfers - North Carolina)
W74-03122

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR MODIFICATION OF A BOAT DOCK AND RAMP.
Renton City Planning Dept., Wash.
For primary bibliographic entry see Field 06G.
W74-03124

SOCIAL AND ECONOMIC IMPACT ON URBAN AREAS OF 'WATER POLICIES FOR THE FUTURE,' THE NATIONAL WATER COMMISSION REPORT,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 06B.
W74-03177

POLICY ISSUES RELATED TO URBANIZATION,
Colorado Univ., Boulder. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06B.
W74-03178

3E. Conservation in Industry

THE POLLUTION POTENTIAL IN PESTICIDE MANUFACTURING.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 05C.
W74-02685

STIMULATION MODES OF GEOTHERMAL AQUIFERS,
Stanford Univ., Calif.
For primary bibliographic entry see Field 04B.
W74-02876

3F. Conservation in Agriculture

FUNCTIONS TO PREDICT EFFECTS OF CROP WATER DEFICITS,
California Univ., Davis. Dept. of Water Science and Engineering.
J. I. Stewart, and R. M. Hagan.
Journal of the Irrigation and Drainage Division American Society of Civil Engineers, Vol 99, No IR4, Proceedings paper No 10229, p 421-439, December 1973. 4 fig, 38 ref.

Descriptors: *Water resources, *Irrigation efficiency, *Crop production, *Evapotraspiration, *Droughts, Estimating, Computer programs, Mathematical models, Optimization, Planning, Management, Climate, Soil water, Systems analysis, Profit, *Water utilization.
Identifiers: Agricultural products, Economic analysis.

Water economists and engineers require methods for developing water-production functions useful in quantitatively estimating yields, profits, or both, for principal irrigated crops under water-deficit conditions. Discussed is a well-advanced research program which is aimed at quantitative prediction of relations between principal crops and water. The goals are to: (1) estimate functional relations between crop yield (Y) and water at all water supply levels, water being defined as seasonal depths of both evapotranspiration (ET) and irrigation (IRR); and (2) optimize water management by maximizing profit or water use efficiency. Conflicting reports from experiments in containers and in the field have been reconciled to illustrate basic relations between crop growth and water use. Approaches are outlined for estimating Y versus ET functions dependent only on crop variety and climate. The functions show maximum yield at any seasonal ET level, and minimum ET at any level of Y. Thus defined, the Y versus ET functions assume factors other than water to be nonlimiting, as well as optimal timing and intensity of planned ET deficits. Elements under consideration are those required in a model for elaborating normative Y versus IRR functions which reflect optimal irrigation programming with respect to maximizing either yield or net income at all water levels. (Bell-Cornell)
W74-02680

THE MUSKEGON COUNTY PLAN OF WASTE WATER REUSE.
For primary bibliographic entry see Field 05D.
W74-02846

INVESTIGATION ON THE ECOLOGY AND CONTROL OF WILD OAT (AVENA FATUA L.) UNDER THE CONDITIONS IN WROCLAW VOIVODESHIP, (IN POLISH),
Instytut Uprawny Nowozenia i Gleboznawstwa, Wroclaw (Poland).
H. Pejka.
Pamiet Pulawski. 46 p, p 83-119. 1971. Illus. (English summary).
Identifiers: *Avena-Fatua, Beet, Control, Ecology, Germination, Herbicides, *Oats, *Poland (Lower Silesia), Sugar, Wheat.

Avena fatua L. is widespread in Lower Silesia. It occurs in cereals, root crops, flax and leguminous cultures. The aggressiveness of this species in relation to the cultivated plants grows with the intensity of its occurrence per unit area. One of the factors favoring the spread of wild oats on arable fields is the seed vitality, another is the ecological conditions under which development may occur. The seeds show a full germination capacity in the second and third year after physiological maturity. Seeds may germinate from a depth of 18 cm. Humidity and air conditions of the soil are important. The growth and development of A. fatua may occur under different soil moisture conditions but both drought periods and excess water have a negative effect on productivity. The control of wild oats in the field cultures is difficult. The most effective method of destroying this weed is the application of suitable herbicides in connection with the agrotechnique of the field cultures. Methods useful for spring wheat and sugar beets are outlined.--Copyright 1973, Biological Abstracts, Inc.
W74-02921

LOSS OF NITROGEN FROM VARIOUS NITROGEN FERTILIZERS ON IRRIGATED LAND,
P. V. Protasov, and G. D. Korosteleva.
Soviet Soil Science, Vol 4, No 5, p 566-570, Sept-Oct. 1972. 4 tab, 13 refs. (Translated from Agrokhimiya, No 10, 1972).

Descriptors: *Cotton, *Nitrogen compounds, *Fertilizers, *Application methods, Leaching, Plant growth, Environmental effects, Soil analysis, Soil chemical properties, *Irrigation effects.
Identifiers: *Uzbekistan (USSR).

Each year the cotton-growing farms of Uzbekistan apply large quantities of nitrogen fertilizers to the crop, some of which is taken up by the plants, some is fixed by the soil microflora, and some migrates into the deep layers and groundwater because of the high mobility of nitrogen compounds. Nitrogen losses were studied under laboratory conditions after addition of various forms of nitrogen to the soils of the irrigated zone of Uzbekistan. The experiment was performed in polyethylene tubes 2.0 m high and 4.2 cm in diameter, with each containing 3.5 kg of soil. The soil was packed 1.6 m high in the tube and evenly compacted mechanically and then by wetting. When dry, nitrogen fertilizers were added to a depth of 3 cm at a rate of 100 mg of N/kg of soil. The soil was watered 5 times for 3 months at a rate of 7000 cubic meters/ha. At the end of the experiment, the soil was analyzed layer by layer for its content of ammonia and nitrate nitrogen to assess the main losses of fertilizer nitrogen from the soil. Losses of nitrogen from different forms of nitrogen fertilizers through irrigation were observed in all soils in the irrigated zone. Losses from hygroscopic and readily available nitrate fertilizers were high. Differences were noted in this respect between the ammonia and amide forms of fertilizers. Leaching to deep layers accounted for most nitrogen fertilizer losses. (Black-Arizona)
W74-02936

WATER REQUIREMENTS OF VARIOUS CROPS IN ARID AND SEMI-ARID ZONES OF TURKEY,
Soil Conservation Research Inst., Ankara (Turkey). Irrigation and Drainage Div.
O. Beyce.
In: Cento Seminar on Agricultural Aspects of Arid and Semi-arid Zones, September 19-23, 1971, Tehran, Iran, Central Treaty Organization 1972, p 191-211. 18 tabs.

Descriptors: *Water requirements, *Crop production, Arid climates, Semiarid climates, Land use, *Irrigation practices, Irrigation programs, On-site data collections, Hydrologic models, *Evapotranspiration.
Identifiers: *Turkey.

A discussion of Turkey's general climate, present land use patterns, effects of irrigation on yields of 10 crops in various parts of Turkey, and a brief history of irrigation practices of this region are presented. Locations of research stations currently engaged in irrigation research are also given. Raw data from the reports and files of these stations have been compiled since 1969 and monthly consumptive use values evaluated for the crops of their respective area. Some of these data are presented in tabular form. Current research emphasizes the process of creating models to cor-

relate data with climatic factors. A hydrological water balance equation has been simplified to: (R + I) - (E) ± plus or minus S, where R ± precipitation, I ± irrigated water, E ± evaporatranspiration, and S ± change in water storage. This equation was used to estimate monthly evapotranspiration values for various crops in different locations in Turkey, and experimental results are presented in 9 tables for wheat, alfalfa, sugar beets, cotton,potatoes, beans, melons, tomatores, and sesame. (Black-Arizona)
W74-02937

MEASURES FOR BETTER UTILIZATION OF IRRIGATION POTENTIAL IN THE ARID AND SEMI-ARID ZONES OF WEST PAKISTAN AND A PROPOSAL FOR FUTURE COORDINATED RESEARCH ACTIVITIES IN THIS FIELD SUITED TO THE CENTO REGION,
Irrigation Research Inst., Lahore (Pakistan).
S. M. Ayoob, and I. Ahmad.
In: Cento Seminar on Agricultural Aspects of Arid and Semi-arid Zones, September 19-23, 1971, Tehran, Iran, Central Treaty Organization 1972, p 51-89. 6 figs, 8 tabs.

Descriptors: Water resources development, Water storage, *Water loss, Seepage, Reservoir evaporation, Evaporation, Transpiration, Water consumption, *Water management (Applied), Arid lands, Research and development, *Irrigation, Efficiency, Asphalt concrete, *Canal linings, *Retardants.
Identifiers: *West Pakistan.

A discussion is presented of the general climate of West Pakistan, its water potential and water losses at various stages (e.g. seepage; evaporation from reservoirs, ponds, and bare soil; transpiration; and conventional irrigation practices), and the current pressure being exerted on the resources of this region by an increasing human population. Possible ways to conserve water are outlined by: (1) reducing seepage losses by lining irrigation canals, (2) proper alignment of watercourses, (3) keeping watercourses free from weeds, (4) reducing losses from free water surfaces via retardants, e.g. oils, alcohols, and emultions of mineral and vegetable oils, (5) minimizing losses from bare soil and transpiration from plants by maintaining water tables at optimum depths with proper drainage measures, (6) improving irrigation practices by cultivating in blocks for better watercourse alignment, using basin and furrow irrigation to prevent over- or under-irrigation, and using sprinklers instead of conventional gravity irrigation to avoid heavy water loss from percolation resulting in waterlogging and increased salinity, and (7) using underground asphalt barriers to prevent infiltration and rising up of water. A proposal for future coordinated research (a) emphasizes the use of asphalt as canal lining material, (b) recommends the establishment of an agro-chemical complex as a prerequisite for making asphalt barriers a success, and (c) lists 16 prospective planned studies which will increase understanding and technical knowhow in asphalt barrier technology and point the way for future research is instituted. (Black-Arizona)
W74-02939

DIFFERENTIAL TOLERANCE OF SIX LEGUMINOUS CROPS TO TERBUTRYNE,
Hebrew Univ., Rehovot (Israel). Dept. of Field and Vegetable Crops.
A. Eshel, and B. Rubin.
Israel Journal of Agricultural Research, Vol 22, No 1, p 11-15, April 1972. 2 tab, 1 fig, 5 ref.

Descriptors: *Herbicides, *Weeds, *Legumes, Resistance, Crop production, Transpiration, Photosynthesis, Consumptive use, Water loss, Toxicity, Crop response, Plant physiology.
Identifiers: *Terbutryne.

Terbutryne (4-ethylamino-2-methylthio-6-t-butylamino-1,3,5-triazine) is a new herbicide recently introduced for selective control of annual broadleaved and grassy weeds in various crops to reduce interspecific competition with crop plants and soil water loss through transpiration. The effect of the herbicide on photosynthesis and top growth was studied in six legumes: broad beans, chickpeas, peanuts, peas, snap beans, and soybeans. The terbutryne used in all experiments was a wettable powder formulation. The effect on photosynthesis was evaluated by measuring the evolution of oxygen from illuminated leaf discs by a manometric technique in a Gilson differential respirometer. The phytotoxicity of terbutryne was studied by growing the six legume species in clay soil (43 percent sand, 20 percent silt, 37 percent clay, and 1.5 percent organic matter at pH 7.4) containing the herbicide. The various crops responded differently, the most resistant species being peanuts. Soybeans and snap beans were most susceptible, whereas broad beans, peas, and chickpeas were intermediately susceptible. Localized applications of terbutryne to different soil layers indicated that the herbicide was absorbed by roots but not by the emerging shoots of the six species. Field tolerance of the intermediate and highly susceptible legumes is probably due to the fact that the plants do not absorb the herbicide because it is absent from the root zone. (Black-Arizona)
W74-02941

THE SEASONAL GROWTH OF LOVEGRASS (ERAGROSTIS CURVULA) ON DEEP SANDY SOILS IN A SEMI-ARID ENVIRONMENT,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Land Resources Management.
P. Farrington.
Australian Journal of Experimental Agriculture and Animal Husbandry, Vol 13, No 63, p 383-388, August 1973. 4 fig, 1 tab, 16 ref.

Descriptors: *Forage grasses, *Plant growth, *Sands, *Seasonal, *Australia, Rainfall, Semi-arid climates, Crop production, Water supply, Distribution, Crop response, Moisture availability, Limiting factors.
Identifiers: *Lovegrass.

The use of sub-tropical grasses for pastures in deep sandy soils in Mediterranean-type environments has not been examined in detail in Australia. In 1965, a detailed study was begun to study the seasonal growth characteristics of lovegrass and its potential as a perennial pasture grass on deep sandy soils in the Western Australian wheatbelt at 20 deep-sand sites near Meckering. The sites covered a representative range of sand types and topographical situations within a 6 km sq area, and three plots (2.4 x 4.2 m sq) were established. Each plot contained 10 sample plants of a robusta green type of lovegrass spaced on a 60 cm grid in two rows of five plants surrounded completely by single guard rows. After an establishment phase of nine months, the plots were harvested on 14 occasions, mostly at eight-week intervals. The seasonal growth pattern of lovegrass resulted in over 80 percent of annual dry matter yield being produced outside the period of most effective rainfall (April-August). Yields were considerably higher than that of annual pastures on similar soils. Highest grass yields were obtained at sites with a water table within 150 cm of ground surface. Lovegrass is unlikely to succeed at sites without a water table because of inadequate moisture availability in summer. Also, slow growth rates in winter (reduced ability to compete with winter-growing annual pasture species) and low nutrient concentrations during the warmer months are likely to limit its forage value to stock. (Black-Arizona)
W74-02942

WATER, LAND, AND ENVIRONMENT IMPERIAL VALLEY: LAW CAOUGHT UP IN THE WINDS OF POLITICS,
California Univ., Berkeley.
For primary bibliographic entry see Field 06E.
W74-03127

IMPLICATIONS OF SELECTED NATIONAL WATER COMMISSION RECOMMENDATIONS TO AGRICULTURAL POLICY,
North Dakota Water Resources Research Inst., Fargo.
For primary bibliographic entry see Field 06B.
W74-03181

WATER RESOURCES POLICY ISSUES RELATED TO AGRICULTURE,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 06B.
W74-03182

REUSE IRRIGATION CUTS COSTS,
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 05D.
W74-03194

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

RIVER: RECOMMENDATIONS FOR IMPROVING THE VALLEY ENVIRONMENTAL RESOURCES,
North Dakota State Univ., Fargo. Coll. of Engineering and Architecture.
For primary bibliographic entry see Field 06B.
W74-02651

RIVER, RECOMMENDATIONS FOR IMPROVING THE VALLEY ENVIRONMENTAL RESOURCES, ADMINISTRATIVE REPORT,
North Dakota State Univ., Fargo. Coll. of Engineering and Architecture.
For primary bibliographic entry see Field 06B.
W74-02652

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION,
Delaware Univ., Newark. Div. of Urban Affairs.
For primary bibliographic entry see Field 06B.
W74-02654

INVESTIGATION OF A NORTHEASTERN WISCONSIN LAKE ECOSYSTEM: AN INTERDISCIPLINARY APPROACH. PHASE II--MANAGEMENT PROBLEMS AND ALTERNATIVES,
Wisconsin Univ. Center, Marinette.
For primary bibliographic entry see Field 06B.
W74-02662

ECONOMIC CRITERIA FOR DECISIONS ON PRESERVATION AND ALTERATION OF NATURAL RESOURCES WITH SPECIFIC REFERENCE TO FRESHWATER WETLANDS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 06B.
W74-02671

A STATISTICAL APPROACH TO DYNAMIC MODELING AND CONTROL OF WATER DISTRIBUTION SYSTEMS,
Polytechnic Inst. of Brooklyn, N.Y.
R. DeMoyer, Jr.
Available from the National Technical Information Service as PB-226 604, $12.25 in paper copy, $1.45 in microfiche. Ph.D. Thesis, June 1973. 188 p, 34 fig, 20 tab, 92 ref, 4 append. OWRR C-3166 (3734) (2).

Descriptors: *Water distribution (Applied), *Statistical models, *Dynamic programming, *Simulation analysis, *Operating costs, Optimization, Regression analysis, Demand, Time Networks, Pipe flow, Pumps, Rainfall, Temperature, Effects, Equations, Mathematical models, Systems analysis.
Identifiers: Kalman filters, Tank depths, Cost minimization.

An overall system study of the automatic control of elevated storage dominated water distribution systems is presented. The control objective opts to maintain adequate customer pressure and to minimize operating costs while keeping system variables within constraints. A high speed statistical water distribution system model has been developed which makes possible automatic control by dynamic programming. The model consists of empirical relations whose unknown coefficients are obtained from the analysis of operating data, providing a system simulation much faster than conventional network models explicitly calculating all pipe flows. The model is kept abreast of system changes by employing regression recursively by means of a Kalman filter. To implement dynamic programming control, demand data are analyzed to produce a predictable mean value function. Time varying demand analysis determines which weekdays have significantly different demand curves and the effects of weather and temperature on water consumption. Calculated are time varying thresholds of tank depths which, when crossed, require discrete pump changes to take place. The control minimizes pumping energy while maintaining tank depths within given constraints. Simulation of control of a pressure district in Philadelphia shows a 4.9% saving in pumping energy. Operating cost is reduced by holding tank depths lower and more constant than the wide tank depth excursions experienced under the 'floating tank' policy. (Bell-Cornell)
W74-02673

FLOOD CONTROL PROJECT PLANNING BY MATHEMATICAL PROGRAMMING: A PROJECT-EXPANSION APPROACH,
Illinois Univ., Urbana.
G. Cortes-Rivera.
Available from the National Technical Information Service as PB-226 349, $15.00 in paper copy, $1.45 in microfiche. Ph.D. Thesis, 1973. 243 p, 38 fig, 39 tab, 100 ref, 3 append. OWRR B-060-ILL (3).

Descriptors: *Water resources development, *Project planning, *Flood control, *Linear programming, *Dynamic programming, *Methodology, *Land use, Economics, Reservoirs, Optimization, Hydrologic aspects, Agriculture, Timing, Size, Structures, Discount rates, Inflation (Economic), Institutional constraints, Levees, Systems analysis, Mathematical models.
Identifiers: Embarras River Basin (Ill).

A methodology for planning comprehensive flood control projects which allows the identification of optimum flood control plans over the planning period is developed. Flood-hydrology analysis provides information on the probability of occurrence of a given flood in any year of the planning period. Parametric linear programming is used to determine the optimal agricultural land-use policy corresponding to any given combination of magnitudes of the project's structural components (The non-structural component of the project is the agricultural land-use of the tracts protected by levees). Discrete differential dynamic programming is presented for finding the optimal timing and size of the expansions of the structural components. Optimal expansions of the project are given for several values of economic parameters including the discount rate, the rate of land-value differential inflation, and budgetary and institutional constraints. The methodology is applied to a one-detention reservoir, two-levee flood control project for the Embarras River basin in Illinois. (Bell-Cornell)
W74-02674

CHANCE-CONSTRAINED MODEL OF SYSTEM OF RESERVOIRS,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
G. L. Curry, J. C. Helm, and R. A. Clark.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY12, Proceedings paper No 10246, p 2353-2366, December 1973. 3 fig, 2 tab, 11 ref.

Descriptors: *Multiple-purpose reservoirs, *Optimization, *Stochastic processes, *Probability, Hydraulics, Water resources, Decision making, Computer programs, Inflow, Demand, Constraints, Equations, Time, Mathematical models, Systems analysis.
Identifiers: *Chance-constrained programming, Nonlinear separable programming, Operating policy, *Reservoir levels.

Chance-constrained programming is used to model a system of linked multipurpose reservoirs. The model objective is to determine an optimal operating policy for a given time sequence of minimum and maximum reservoir levels. The unregulated inflows into the reservoirs are assumed to be stochastic with a known distribution for each time frame. The chance-constraints, based on material balance equations, are converted to an equivalent linear deterministic constraint set. The linked system model is a natural extension of the single reservoir model. The problem of stochastic demands as well as stochastic inflows is shown to be a straightforward generalization of the stochastic inflow problem. Since the resulting constraints for these models are linear and the decision variables are deterministic rather than random variables, linear, quadratic, and even general convex objective functions can readily be handled. (Bell-Cornell)
W74-02676

DEVELOPMENT OF A MARGINAL ANALYSIS CAPABILITY FOR WATER RESOURCES SIMULATION MODELS,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
E. McBean, and J. Schaake, Jr.
In: Proceedings of the Summer Computer Simulation Conference, Montreal, P.Q., Canada, July 17-19, 1973. 12 p, 9 fig, 11 equ, 18 ref.

Descriptors: Water resources development, *Planning, *Reservoirs, *Simulation analysis, *Markov processes, Analytical techniques, Estimating, River basins, Streamflow, Reservoir releases, Reservoir storage, Optimum development plans, Benefits, Equations, Design, Systems analysis, Mathematical models, Computer models.
Identifiers: *Marginal analysis, Search techniques, Gradient vectors, Response surface, Marginal value estimates.

A procedure is described that, given the information obtained from a single fun of a simulation model, allows estimation of the gradient vector of a response surface for a water resources planning problem. This gradient information is then useful in combination with a search procedure to significantly increase the efficiency of search for the optimal water resources plan configuration. The basis for the gradient estimator is developed from a probabilistic Markov model of the reservoir state transitions from one time period to another. The marginal analysis capabilities arise by recognizing how the reservoir transitions would be changed by modification of decision variables. The behavior of the gradient estimator is examined under several conditions in application to a simple example problem. (Bell-Cornell)
W74-02682

PA MONG STAGE ONE FEASIBILITY REPORT. APPENDIX VI. ECONOMIC, AGRICULTURAL, SOCIAL AND FINANCIAL ANALYSIS.
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-02686

PA MONG STATE ONE FEASIBILITY REPORT. APPENDIX VII. COROLLARY STUDIES.
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-02687

WATER RESOURCES DATA FOR COLORADO, 1972: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 07C.
W74-02724

STREAM CHANNELIZATION (PART 5).
For primary bibliographic entry see Field 06G.
W74-02777

STREAM CHANNELIZATION (PART 6).
For primary bibliographic entry see Field 06G.
W74-02778

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1974.
For primary bibliographic entry see Field 06E.
W74-02780

RIVER BASIN AUTHORIZATIONS AND RELATED WATER RESOURCE PROJECTS.

Hearings--Subcomm. on Water Resources of the Comm. on Public Works, U.S. Senate, 93d Cong, 1st Sess, April 30, May 1, 2, 3, and 11, 1973. 1076 p, 15 fig, 10 tab.

Descriptors: *Flood control, *Flood protection, *Watershed management, *Government finance, *Federal government, Economic efficiency, Water resource development, Legislation, Water policy, Administration, River basins, Planning, Mississippi river basin, Political aspects, Rivers and Harbors Act.

The hearings were directed at determining the potential value of flood control and related water resource projects in preventing or minimizing the effect of some future flood or water shortage. Agenda included sixteen river basin monetary authorization requests, about a dozen legislative proposals, and four additional projects not included in any bill at that time. The Army Corps of Engineers gave testimony and presented reports in reference to the flood ravaged Mississippi Valley as well as to the need and importance of authorizing funds for specific water resources and river basin projects throughout the country. Witnesses included Senators, Representatives, mayors, and other representatives of business, government and education. Testimony of all witnesses was primarily directed toward obtaining authorization and federal financial aid for projects in their specific locality. Also included are statements and report

by persons not present, texts of proposed legislation, detailed report of projects currently in operation, and letters and commentaries by various individuals or groups interested in the particular projects or the program in general. Maps, charts, and tables are presented for support throughout the hearings. (Conko-Florida)
W74-02781

CHINCOTEAGUE INLET, NAVIGATION PROJECT, ACCOMACK COUNTY, VIRGINIA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 08A.
W74-02800

THE EFFECTS OF AUTHORIZATION FOR WATER IMPOUNDMENTS ON SHORELAND TRANSITION,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 06B.
W74-02826

COMPARISON OF METHODS OF DERIVING UNIT HYDROGRAPHS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W74-02828

BAYLANDS SALT WATER FLOOD CONTROL PLANNING STUDY.

Report to the Santa Clara County Flood Control and Water District. January, 1973. 160 p, 27 plates, photos, 30 tab, 4 append.

Descriptors: *Flood control, *Levees, *Estuaries, *Wetlands, Ecology, *Saline water, Planning, Land use, Soils, Geology, Environmental effects, Financing, Institutions, Design criteria, *California.
Identifiers: *San Francisco Bay (Calif.), Santa Clara County (Calif.), Baylands, San Jose (Calif.).

Santa Clara County is located at the southern shallow end of the San Francisco Bay. Both fresh water and salt water flooding has become an increasing problem as urbanization continues. The Santa Clara County Flood Control and Water District presently is responsible for fresh water flooding and this study is focused on determining whether the District should also be responsible for salt water flooding control. The study identifies the flooding problems in an area up to 10 feet above sea level and evaluates possible solutions as a basis for policy-making by the District. Separate chapters are devoted to local and regional agencies with water resource functions in the area, municipal and county planning policies, population and land use projections, ecological relationships in the Baylands, local geology and soils, design criteria for flood control works, and the economics and financing of proposed projects. Some of the general findings are: that the existing levees do not provide adequate protection from salt water flooding, that flooding problems have been intensified by subsidence of the low-living Baylands, that the ecology and the soil characteristics of the area are very important, and that future land use demands in the County can be met without using the wetland areas. (Elfers-North Carolina)
W74-02829

WATER QUALITY MANAGEMENT PLAN FOR THE GREEN AND CEDAR RIVER BASINS IN THE STATE OF WASHINGTON: PROGRESS REPORT FOR FISCAL YEAR ENDING JUNE 30, 1972.
Stevens, Thompson and Runyan, Inc., Portland, Oreg.
For primary bibliographic entry see Field 05D.
W74-02842

DIVERSION OF FLOOD FLOWS FROM THE CONNECTICUT RIVER AND THE EFFECT ON GROUNDWATER SUPPLIES,
Massachusetts Univ., Amherst. Dept. of Geology.
For primary bibliographic entry see Field 04B.
W74-02847

ENGINEERING WORK LEADING TO A ROCK TUNNEL PLAN,
Greater Chicago Metropolitan Sanitary District, Ill.
For primary bibliographic entry see Field 08A.
W74-02853

EFFICIENT FLOOD CONTROL OF DAMS EQUIPPED WITH CREST GATES,
For primary bibliographic entry see Field 08C.
W74-02911

BURNING AS A SUPPORTING TREATMENT IN CONTROLLING WATERHYACINTH IN THE SUDAN. PART I. ROUTINE BURNING,
Khartoum Univ. (Sudan). Faculty of Science.
B. F. Mohamed, and F. F. Bebawi.
Hyacinth Control Journal, Vol 11, p 31-34, 1973. 5 fig, 2 tab, 1 ref.

Descriptors: *Burning, *Ultimate disposal, *Water hyacinth, *Aquatic weed control, Harvesting, Dehydration, Seeds, Germination.
Identifiers: *Sudan, White Nile (Sudan).

Sporadic heaps of mechanically removed waterhyacinth and naturally stranded communities, both located along the banks of the White Nile, form nuclei for probable future local reinfestations. Burning such potentially threatening centers is an inevitable precaution, which has been practiced since 1960. Quick burning is timesaving and therefore economical. Influence of wind upon relative burning efficiency was investigated. Experiments were performed in Gulli (Dueim District, Sudan) May to June 1971. Confining burning to March and April is suggested as by March both natural accumulations and heaps are sufficiently dehydrated; also, burning in March safeguards against prolonging opportunity for dispersal. Early burning would undoubtedly destroy vegetatively dormant forms which might otherwise remain to rejuvenate when moisture requirements are met as the climatic conditions become favorable with a progressive increase in relative humidity. Dry, spongy-textured waterhyacinth would resist burning or at least render operations less efficient. Possible amendments to routine burning practices under Sudan conditions are suggested. The generation of high temperature in routine burning builds up better efficiency in suppressing seed and vegetative regeneration at innumerable potential centers of reinfestation. (See also W74-02919) (Jones-Wisconsin)
W74-02918

BURNING AS A SUPPORTING MANAGEMENT IN THE CONTROL OF WATERHYACINTH IN THE SUDAN. PART II. BACKBURNING,
Khartoum Univ (Sudan). Faculty of Science.
B. F. Mohamed, and F. F. Bebawi.
Hyacinth Control Journal, Vol 11, p 34-37, 1973. 1 tab, 1 fig, 13 ref.

Descriptors: *Burning, *Aquatic weed control, *Water hyacinth, Management, Ultimate disposal, Harvesting, Germination, Seeds.
Identifiers: *Sudan, White Nile (Sudan).

Heavy infestation of waterhyacinth obstructs navigation, impedes normal water flow causing stagnation, hinders fishing, and chokes irrigation canals along the greater part of the 600-km stretch of the White Nile. The primary aim of burning has been to destroy seeds before favorable conditions commence which permit germination and successful establishment of new plants. How backburning would enhance the destruction efficiency inflicted upon the potentially dangerous seed crop of waterhyacinth was investigated. Position of the seeds at the time of burning is critical. Heat generated by the traditional headburning procedure is, undoubtedly, sufficient to kill seeds engulfed in the litter of the upper strata in any form of accumulation, however, since such heat does not normally penetrate to the ground surface underlying seeds may not be destroyed. Maximum destruction is accomplished in excessively hot and more lasting fire associated with backburning heaped, dry waterhyacinth components. Natural accumulations respond favorably to backburning and a fairly complete destruction is obtained, though under moderate temperatures and shorter duration than in heaps. Heaps undergoing headburning leave incompletely burnt centers and a fair amount of coarse remnants on the ground surface. (See also W74-02918) (Jones-Wisconsin)
W74-02919

EFFECT OF PH AND HIGH PHOSPHORUS CONCENTRATIONS ON GROWTH OF WATERHYACINTH,
Florida Univ., Fort Lauderdale. Agricultural Research Center.
For primary bibliographic entry see Field 05C.
W74-02934

SMALL MAMMALS INCREASE ON RECENTLY CLEARED AND SEEDED JUNIPER RANGELAND,
Bureau of Sport Fisheries and Wildlife, Provo, Utah.
M. F. Baker, and N. C. Frischknecht.
Journal of Range Management, Vol 26, No 2, p 101-103, March 1973. 2 tab., 4 ref.

Descriptors: *Animal populations, Pine trees, *Rodents, Damages, *Small animals (Mammals), *Juniper trees, Range management, *Vegetation regrowth, Revegetation.
Identifiers: Pinyon-juniper.

Although rodents are known to contribute to the failure of revegetation efforts in some plant types, little is known of small mammals in the pinyon-juniper type or of their reaction to range renovation projects. Small mammal numbers were sampled by snap trapping on six areas in central Utah where juniper range had been cleared and seeded. Results from untreated, old juniper stands were compared with those from areas which were: (1) chained two times and seeded, (2) chained, windrowed, and seeded, and (3) chained, windrowed, seeded, and the windrows burned. On one area, which was trapped both before and 3 years after treatment, numbers of deer mice (Peromyscus maniculatus) and pocket mice (Perognathus parvus) increased greatly in the first 2 years following treatment, then declined sharply to a level which was still higher than before treatment. On two areas which were trapped for two years after treatment, many more small mammals were caught in the second year. Older seedlings had about the same number of small mammals as did untreated juniper. Small mammals showed a clear preference for windrowed slash. This was particularly true of deer mice and long-tailed voles (Microtus longicaudus). (Black-Arizona)
W74-02938

MEASURES FOR BETTER UTILIZATION OF IRRIGATION POTENTIAL IN THE ARID AND SEMI-ARID ZONES OF WEST PAKISTAN AND A PROPOSAL FOR FUTURE COORDINATED RESEARCH ACTIVITIES IN THIS FIELD SUITED TO THE CENTO REGION,
Irrigation Research Inst., Lahore (Pakistan).
For primary bibliographic entry see Field 03F.

W74-02939

VEGETATIVE RESPONSE TO CHEMICAL CONTROL OF BROOM SNAKEWEED ON A BLUE GRAMA RANGE,
Wyoming Univ., Laramie. Div. of Plant Science.
R. W. Gesink, H. P. Alley, and G. A. Lee.
Journal of Range Management, Vol 26, No 2, p 139-143, March 1973. 1 tab, 3 fig, 17 ref.

Descriptors: *Herbicides, Plant growth, *Range management, Plant physiology, Vegetation, *Plant ecology, Grasses, Desert plants, Cacti, Forage grasses, Gramma grasses, *Chemcontrol, *Wyoming.
Identifiers: Needle-and-thread, *Broom snakeweed.

Relatively little information is available regarding the long-term effects of herbicides used to control undesirable plants on native rangeland, particularly as they influence non-target components of the plant community. This study evaluates vegetative change on a blue grama (Bouteloua gracilis) range in southeastern Wyoming five years after herbicide treatment. Herbicide applications were: Silvex: 2 and 4 lb/acre; picloram (Tordon), 0.5 and 1 lb/acre; picloram w/2, 4-D, 0.25 + 1 lb. and 0.5 + 2 lb/acre respectively. The treatments were initially made to investigate their effeectiveness in controlling broom snakeweed (Gutierrezia sarothrae) which was in abundance on the site. Silvex treatments did not control snakeweed. Recent investigations suggest that this occurred because treatments were applied too late into the growing season after the plants had developed beyond more susceptible growth stages. All rates of picloram, either along or in combination with low rates of 2, 4-D effectively controlled broom snakeweed. Picloram also eliminated the low amounts of plains pricklypear (Opuntia polyacantha) present among the dense stands of snakeweed. Blue grama was initially injured by the 0.5 and 1 lb/acre rates of picloram, but needle-and-thread (stipa comata) was damaged only by the 1 lb/acre rate. This initial injury to the grasses had a renovating effect upon the range, and, in combination with the elimination of undesirable plants, resulted in notable range improvement as measured 5 years after treatment. (Black-Arizona)
W74-02943

PRESCRIBED BURNING ROTATIONS ON PINE-BLUESTEM RANGE,
Forest Service (USDA), Pineville, La. Southern Forest Experiment Station.
H. E. Grelen, and L. B. Whitaker.
Journal of Range Management, Vol 26, No 2, p 152-153, March 1973. 1 tab, 4 ref.

Descriptors: *Burning, *Range grasses, Range management, *Forage grasses, Livestock, Forage palatability, *Seasonal, Winter, *Grazing, *Louisiana.

Burning one-third of grazing units in late winter or early spring adequately distributes grazing and maintains forage quality on southern pine cattle ranges. Recent investigations on ungrazed range have indicated, however, that forage quality might be further enhanced by burning smaller patches in winter, spring, and summer. Two adjacent 80-acre grazing units of the Palustris Experimental Forest near Alexandria, La., were selected for the study. All commercialsized pines were removed several years before the study began, and large hardwoods were killed by herbicide injections. In open areas, dense grass, principally pinehill bluestem (Andropogon divergens) and slender bluestem (A. tener) was interlaced with blackberry briers (Rubus sp.). Exclusion of fire and grazing had allowed an increase of cutover muhly (Muhlenbergia expansa), an early-maturing grass that is unpalatable to cattle in the full-leaf stage. A different third of one unit was burned each March 1 (winter). Approximately three-sevenths of the other unit was burned each year--one-seventh in winter (March 1), one-seventh in spring (May 1), and one-seventh in summer (July 1). Seasonal burning offered no apparent advantage over winter burning in beef production. With proper stocking, the one-third of the range burned in winter of the current year was grazed almost continuously by the entire herd. Because different thirds are burned in the 2 years following heavy use, the plants had 2 years of light grazing in which to regain vigor. Thus, close grazing accomplished on the winter-burned range what the delayed burns did on seasonally burned range. (Black-Arizona)
W74-02944

RUSSIAN-THISTLE (SALSOLA) SPECIES IN WESTERN UNITED STATES,
Cincinnati Univ., Ohio. Dept. of Biological Sciences.
J. C. Beatley.
Journal of Range Management, Vol 26, No 3, p 225-226, May 1973. 10 ref.

Descriptors: Halophytes, *Desert plants, *Systematics, Southwest U.S., *Poisonous plants, Population, Distribution patterns, Range management, *Weeds, California, Nevada, Utah, Arizona, Genetics.
Identifiers: *Russian thistle.

Russian-thistle has been treated in the plant manuals and floras as a single species, usually as Salsola pestifer A. Nels. or S. kali L. The purpose of this report is to record, for the information of those who deal with these noxious weeds on western rangelands and elsewhere, that Russian-thistle populations in western United States consist of either of two species, or both, and are distinguishable at all stages in the field. S. pestifer is now replaced by an earlier name, S. iberica. The second species, S. paulsenii, prevails in many areas, especially in the Southwest. Where growing together, they appear to hybridize freely resulting in populations exhibiting varying degrees of genetic introgression. Both species and their genetic intergrades are known to occur in a number of areas in California, in the southern part of Nevada, in southern and northwestern Utah, and in Arizona; but S. paulsenii is not known from Colorado. It is probable that both occur to some extent throughout the western U.S. especially over the Intermountain Region, and that S. paulsenii is more prominent at lower elevations in the southwestern part of the country, and that S. iberica is the prevailing species of the higher elevations and latitudes of the West. Definitive geographic distributions are dependent upon future recognition of the two species and collecting of the genus in all of the western states. (Black-Arizona)
W74-02945

LOWER WISCONSIN RIVER VALLEY SOIL RESOURCES AND USE POTENTIALS,
Wisconsin Univ., Wasusau. Univ. Extension.
G. E. Musolf, and F. D. Hole.
Trans Wis Acad Sci Arts Lett. 60. p 201-209. 1972. Illus.
Identifiers: Agriculture, Conservation, Recreation, Resources, Rivers, Soils, Valley, Water conservation, *Wisconsin River, *Land use, *Zoning.

Erosion control practices, planting of trees in shelterbelts and plantations, and protection of woodlands from grazing have resulted from a growing awareness by the inhabitants of the need for soil and water conservation and from technical assistance provided to land operators by the Soil Conservation Service and the College of Agricultural and Life Sciences working through cooperative Extension. Recreational activities and residential developments have increased in the area. Recent elevation of standards for the protection of quality of water and other components of the environment, and an increasing appreciation of the scientific, asthetic and recreational values of this principal environmental corridor of Wisconsin point to the need for a practical land zoning system in the valley. It is advantageous to base the zoning on the detailed soil maps that are now available, along with interpretive overlay maps and zoning directives that regulate land use according to site characteristics.--Copyright 1973, Biological Abstracts, Inc.
W74-02957

BENTHIC DREDGE CONSTRUCTION,
Trippensee Corp., Saginaw, Mich. (assignee)
For primary bibliographic entry see Field 08C.
W74-03022

LAND USE AND WATER RESOURCES,
East Malling Research Station, Maidstone, (England).
For primary bibliographic entry see Field 02A.
W74-03024

THE CALIFORNIA STATE WATER PROJECT SUMMARY: NINETEEN-SEVENTY-TWO, APPENDIX C.
California State Dept. of Water Resources, Sacramento.

Bulletin No 132-73, (1973). 31 p.

Descriptors: *Water resources development, *Project post-evaluation, *California, State governments, Water policy, Water supply, Water demand, Water pollution control, Ecology, Flood control, Water quality control, Recreation facilities, Reviews, Project planning, Projections.
Identifiers: *California State Water Project (1972).

The end-of-year status of the California State Water Project is described in this extract from the California Water Commission's November 1972 report on its annual progress review (required by California Water Code Section 165) of project construction and operations. The commission's inspection showed that the State Water Project is achieving or surpassing its goals in diverse fields of accomplishment: (1) it is conserving and delivering water from Plumas County to Los Angeles County for use in homes, farms, and factories; (2) it is starting its second decade of water service in the San Francisco Bay Area; (3) it is readily meeting 1972's sharply increased water needs, caused by the near-drought conditions this year; (4) it is providing family recreation and sport fishing in northern, central, and southern California; (5) its smog-free generation of electric powerls helping to meet increasing energy requirements; (6) it is providing flood control and water quality control; (7) it is maintaining its construction schedule as it nears completion of its first phase; and (8) it is proceeding as a fiscally sound utility, financed by the beneficiaries. (Woodard-USGS)
W74-03026

WATER RESOURCES OF THE PONCE AREA, PUERTO RICO,
Geological Survey of Puerto Rico, San Juan.
N. E. McClymonds.
Commonwealth of Puerto Rico, Water-Resources Bulletin 14, 1972, 26 p, 15 fig, 3 tab, 4 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Water yield, *Puerto Rico, Water quality, Rainfall-runoff relationships, Hydrologic data, Streamflow, Water wells, Aquifer characteristics, Hydrogeology, Groundwater movement, Groundwater recharge, Water utilization, Irrigation, Water supply, Water analysis, Chemical analysis, Water balance.

The movement of water in the Ponce area, Puerto Rico, is summarized for August 1964 to July 1965. Because the study was made during a drought, it is apparent that water in the Ponce area is probably

sufficient to satisfy present needs for both agriculture and man. The 31,000 acre-ft of streamflow to sea represents a substantial surplus that could be utilized. Some part of the 23,000 acre-ft (estimated) of ungaged runoff and groundwater drainage, presumably, could be salvaged also. The water generally is of good quality for most uses. It is estimated that 32,000 acre-ft of groundwater was pumped during the study. Water levels declined considerably in 1964 and 1965, and much greater than average rainfall would be needed to restore the levels of the early years of record. Return flow of irrigation water from both wells and canals is of considerable importance in maintaining the hydrologic balance. If the quantity of irrigation water applied were to be reduced, and if pumpage were to be continued at or near present rates, groundwater levels would decline progressively. Studies of means of artificially recharging the aquifers may be of prime importance if industry were to replace agriculture in the area. (Woodard-USGS)
W74-03038

MINNESOTA NATURAL RESOURCE INFORMATION SYSTEM,
Minnesota State Planning Agency, St. Paul. Environmental Quality Planning.
For primary bibliographic entry see Field 10B.
W74-03053

POTHOLE COMMUNITY MANAGEMENT FOR LIVESTOCK AND WILDLIFE IN THE INTERMOUNTAIN REGION,
Forest Service (USDA), Logan, Utah. Cache National Forest.
F. Gunnell, and G. Smith.
Range Manage. Vol 25, No 3, p 237-240. 1972. Illus.
Identifiers: Ecological studies, Grazing, Livestock, Mountain regions, *Potholes, Waterfowl, *Wildlife, *Land management.

Potholes are depressions of glacial origin occurring on the prairies of northern United States and in some of the Intermountain glaciated valleys. Intermountain potholes provide excellent wetland habitat for numerous species of migratory waterfowl, waders, game and non-game marsh associated birds. Most of the Intermountain pothole areas are located on public lands and are important sources of water for grazing livestock. Grazing is compatible with wildlife needs if ranges are not overgrazed or livestock concentrated around available watering sites. This study was made with the intent of presenting a management plan whereby wildlife and livestock could jointly occupy these pothole areas of the forest lands of the northern Intermountain Forest Region USA to the benefit of both. Ecological stability rather than environmental competition was the goal with application over wide areas of the intermountain west. The study identifies opportunities in designing range developments to complement waterfowl and other species of wildlife on glacial terrain--Copyright 1973, Biological Abstracts, Inc.
W74-03083

MASTER WATER PLAN, LAS VEGAS VALLEY, (WITH MAP SUPPLEMENT).
Boyle Engineering, Las Vegas, Nev.
For primary bibliographic entry see Field 06D.
W74-03117

THE OCEAN EDGE OF SAN DIEGO,
San Diego City Planning Dept., Calif.
For primary bibliographic entry see Field 06D.
W74-03120

LOWER WILLAMETTE RIVER MANAGEMENT PLAN.
ERG Partnership, Portland, Oreg.
Second Draft. August 23, 1973. 65 p, 17 fig, 4 photos, 3 append.

Descriptors: Rivers, Harbors, Navigable rivers, Planning, Dredging, *Oregon, *River regulation, *River basin development.
Identifiers: *River managment, *Willamette River, Portlant (Oregon), Waterfronts, Filling, Riverbanks.

A study team drawn from federal, state, and local regulatory agencies developed management guidelines for the Willamette River from the Sellwood Bridge in Portland to the Columbia River. Need for guidelines was accentuated by receipt of applications to fill or cover 88 acres of the river in 1972 alone. A streamlined procedure for administering permits for river and riverbank alterations is outlined. The management plan is composed of general policies for the entire area governing repetitive actions, management policies applied to 24 gegraphic zones, and conditions placed upon permitted river and riverbank alternations--dredging, fills, structures, and miscellaneous alterations. General policies include minimizing loss of river surface area, encouraging creation of new water surface area, maintenance of water quality, and preservation of unique natural sites. A description, an identification of unique features, and particular management guidelines are given for each geographic zone. Land management policies are not binding upon regulatory agencies not party to the management plan. Twenty supplemental recommendations regarding urban waterfront management are offered. An appendix provides a summary of meetings, interviews, data, maps, and charts on which the plan is based. (Stein - North Carolina)
W74-03121

PRESERVATION OF RESERVOIR SITES,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 06F.
W74-03123

FLOOD PLAIN INFORMATION FOR HARRIS FORK CREEK AND SOUTH FULTON BRANCH, FULTON, KENTUCKY AND SOUTH FULTON, TENNESSEE.
Army Engineer District, Memphis, Tenn.

Prepared for the Cities of Fulton, Kentucky and South Fulton, Tennessee. August, 1971. 35 p, 9 fig, 8 plates, 11 tab., photos.

Descriptors: *Flood protection, *Land use, *Flood damage, *Flood frequency, Flood control, Flooding, Flood profiles, Flood flow, Flood plains, *Tennessee, *Kentucky, Urbanization.
Identifiers: *Flood plain management, Fulton (Kentucky), South Fulton (Tennessee), Harris Fork Creek (Kentucky and Tennessee), South Fulton Branch (Tennessee).

Intended as an aid in solving local flood problems and in planning the best use of the land that lies in the flood plain, this study examines the general conditions and flood history of Fulton, Kentucky and South Fulton, Tennessee located in the upper portion of the Harris Creek Fork drainage basin. Much of the primary business and residential development is located within the flood plains of Harris Fork Creek and South Fulton Branch. Major floods occurred in 1945 and 1957 and flooding continues today since the Corps of Engineers has no existing authorized flood control measures on the two streams within the study area. The characteristics of both streams are similar--relatively straight channels, rectangular basins generally used for agriculture, and overbank areas heavily developed with a combination of business and residential structures. Based on an analysis of the rainfall and runoff characteristics of the general region surrounding the area under study, projections for Standard Project (largest likely to occur) and Intermediate Regional (once in 100 years) Floods are developed, with special relevance to the various adjacent land uses. Maps, profiles and photographs indicate the extent of previous flooding and of flooding that could occur in the Future under present conditions. (Edwards - North Carolina)
W74-03125

CRYSTAL DAM, RESERVOIR, AND POWERPLANT, CURECANTI UNIT, COLORADO RIVER STORAGE PROJECT, COLORADO (SUPPLEMENT TO THE FINAL ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Salt Lake City, Utah.
For primary bibliographic entry see Field 08A.
W74-03130

PUMPED STORAGE DEVELOPMENT AND ITS ENVIRONMENTAL EFFECTS.
For primary bibliographic entry see Field 08B.
W74-03144

THE ECONOMIC EFFECTS OF FLOODS. INVESTIGATIONS OF A STOCHASTIC MODEL OF RATIONAL INVESTMENT BEHAVIOR IN THE FACE OF FLOODS,
Brown Univ., Providence, R.I. Dept. of Economics.
For primary bibliographic entry see Field 06A.
W74-03193

4B. Groundwater Management

FEASIBILITY STUDY: HYDRAULIC FRACTURING OF DRILLED WATER WELLS TO STIMULATE THEIR YIELD,
Water Resource Research Center.
For primary bibliographic entry see Field 08B.
W74-02659

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO: UPPER RIO GRANDE,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W74-02660

PROBLEMS OF UNDERGROUND STORAGE OF WASTES,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 05B.
W74-02732

FLOW CHARACTERISTICS OF A SUBSURFACE-CONTROLLED RECHARGE BASIN ON LONG ISLAND, NEW YORK,
Geological Survey, Mineola, N.Y.
R. C. Prill, and D. B. Aaronson.
Journal of Research of the U S Geological Survey, Vol 1, No 6, p 735-744, November-December 1973. 14 fig, 1 tab, 7 ref.

Descriptors: *Infiltration, *Recharge ponds, *New York, *Artificial recharge, Soil water movement, Groundwater recharge, Pit recharge, Storm runoff, Water reuse, Surface-groundwater relationships.
Identifiers: Long Island (NY).

At the Woodbury recharge basin on Long Island, N.Y., the principal zones controlling infiltration are a surface-loam stratum and an intermediate gravelly, sandy loam stratum. The saturated hydraulic conductivities of these strata are 0.90 and 0.1 ft per day, respectively. The surface loam acts as the principal zone controlling infiltration

until a perched groundwater mound develops above the intermediate gravelly, sandy loam and extends to the bottom of the surface loam; then the intermediate gravelly, sandy loam becomes the principal infiltration controlling zone. Infiltration rates at 15.6 deg C are 1.4 ft per day when the surface loam is acting as the principal controlling zone and 0.5 ft per day when the intermediate gravelly, sandy loam is acting as the principal controlling zone. Projections of the probable infiltration rates associated with both the partial and the complete removal of the surface-loam stratum show that if recharge continues for several days total infiltration would not be greatly different whether or not the loam stratum is completely removed. The principal advantage of completely removing the surface-loam stratum is the resulting greater infiltration capacity during the early stages of ponding. This advantage is offset by potential problems associated with more intensive clogging of the subsurface controlling zone. (Knapp-USGS)
W74-02734

THE MUSKEGON COUNTY PLAN OF WASTE WATER REUSE.
For primary bibliographic entry see Field 05D.
W74-02846

DIVERSION OF FLOOD FLOWS FROM THE CONNECTICUT RIVER AND THE EFFECT ON GROUNDWATER SUPPLIES,
Massachusetts Univ., Amherst. Dept. of Geology.
O. C. Farquhar.
Journal of the New England Water Works Association, Vol 87, No 3, p 218-231, September 13, 1973. 3 fig, 10 ref.

Descriptors: *Groundwater, *Groundwater recharge, *Water management (Applied), *Connecticut River, Water supply, Diversion, Connecticut.
Identifiers: Quabbin Reservoir (Conn).

There are plans to divert water from the main stem of the Connecticut River near Northfield Mountain, Massachusetts to the Quabbin Reservoir, where it will eventually flow by an existing aqueduct to the Boston metropolitan area. Diversion would occur only when flow at a nearby gaging station exceeded 17,000 cfs. which could be in only the spring months when snows melted in the Green and White Mountains. Water would flow to Quabbin by gravity through tunnels yet to be constructed. The proposed diversion of 72 mgd from the river at Northfield would lower the river 0.2 foot at that location. The amount to be diverted by flood skimming is about 1% of the average annual flow. The 0.2 foot drop in river level due to diversion would not significantly affect ground water remaining in the Connecticut River, especially since there are no major aquifers in the floodplain. However, more distant future proposals call for diverting water which would lower the river one foot. The effects of this drop on groundwater quantity are more difficult to predict. If 1970 Corp of Engineers study recommendations were adopted, over 200 new dams would be built in the Connecticut watershed and flows would never reach the 17,000 feet needed for diversion. (Stein - North Carolina)
W74-02847

STIMULATION MODES OF GEOTHERMAL AQUIFERS,
Stanford Univ., Calif.
H. J. Ramey, Jr., P. Kruger, and R. Raghavan.
Paper presented at special session on Geothermal Energy Stimulaton, American Nuclear Society, Las Vegas, Nevada, June 19-20, 1972. 35 p, 6 fig, 4 tab, 19 ref.

Descriptors: *Geothermal studies, *Electric power production, *Aquifers, *Nuclear engineering, Thermal water, Hot springs, Steam, Thermal powerplants, Mechanical engineering, Water quality, Groundwater, Hydrogeology, Porosity, Recharge, Nuclear explosions.

The stimulation of geothermal aquifers through the use of nuclear explosions is feasible if a considerable amount of heat can be recovered from a large volume of fractured rock and a long term fluid production is forecast. Since heat conduction rates of dry rock are not sufficient for replacement of removed heat within reasonable time limits, a porous geothermal aquifer must be a component of a geothermal steam resource suitable for commercial development. The energy available from different geothermal reservoirs varies. Heat may be recovered from rock by boiling a liquid within the pore space, or recycling colder fluid back into the formation. Steam-bearing and hot-water aquifers are compared. Vapor pressure differences for flat and curved liquid surfaces, two-phase flow, and salt concentrations are some factors affecting the boiling of the liquid. The chemical quality of the stimulated geothermal water is of importance. Forecasting production is discussed. Surface flashing, receding flashing, and cyclic production with two chimneys are modes of operation which affect production. Fluid expansion, vaporization of liquid, gravity drainage as well as the influence of fluids from adjacent or underlying aquifers are all mechanisms under which the reservoir can operate. (Tirfie-Vanderbilt)
W74-02876

MEASURES FOR BETTER UTILIZATION OF IRRIGATION POTENTIAL IN THE ARID AND SEMI-ARID ZONES OF WEST PAKISTAN AND A PROPOSAL FOR FUTURE COORDINATED RESEARCH ACTIVITIES IN THIS FIELD SUITED TO THE CENTO REGION,
Irrigation Research Inst., Lahore (Pakistan).
For primary bibliographic entry see Field 03F.
W74-02939

WATER RESOURCES OF THE PONCE AREA, PUERTO RICO,
Geological Survey of Puerto Rico, San Juan.
For primary bibliographic entry see Field 04A.
W74-03038

WATER WELL STANDARDS--ARROYO GRANDE BASIN, SAN LUIS OBISPO COUNTY,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 05B.
W74-03057

HYDRODYNAMICS OF ARTIFICIAL GROUNDWATER RECHARGE (SATURATED FLOW THEORY),
California Univ., Irvine. School of Engineering.
A. C. Amar.
Available from the National Technical Information Service as PB-226 637 $15.50 in paper copy; $1.45 in microfiche. Ph D Thesis, 1973, 221 p, 72 fig, 7 tab, 154 ref, 4 append. OWRR C-3112 (3687) (1).

Descriptors: *Artificial recharge, *Groundwater recharge, *Hydraulic models, *Hydrodynamics, Analytical techniques, Saturated flow, Soils, Sands, Hydrogeology, Geomorphology, Geology, Groundwater movement, Aquifer characteristics, Water quality, Mathematical studies, Equations, Darcys law, Theoretical analysis, Correlation analysis, Evaluation, *Reviews, *Bibliographies.

Use of artificial groundwater recharge as an effective means of reclaiming low-quality water has grown steadily since its inception late in the nineteenth century. As a prerequisite to an optimum design of a recharge system the practicing engineer must be able to predict with reasonable accuracy the hydrodynamic behavior of the proposed system for a given geometry and recharge operation. This study describes the hydrodynamic behavior of a (typical) water recharge system under saturated flow conditions and methods, through the use of a sand model and mathematical models/for the prediction of the transient and steady-state hydrodynamic behavior of the proposed system. The results of the investigation are considered significant in determining the authenticity and the accuracy of the accuracy of the various theories over a wide range of parameters relating to the hydrodynamics of the recharge operation. A comprehensive literature survey as well as an extensive bibliography are also included. (Woodard-USGS)
W74-03091

MASTER WATER PLAN, LAS VEGAS VALLEY, (WITH MAP SUPPLEMENT).
Boyle Engineering, Las Vegas, Nev.
For primary bibliographic entry see Field 06D.
W74-03117

A FLOW PATH GROUND WATER SAMPLER,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
For primary bibliographic entry see Field 07B.
W74-03126

RANDOM DRILLING FOR WATER IN CARBONATE ROCKS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 08B.
W74-03141

GROUNDWATER MOVEMENT,
Bureau of Reclamation, Washington, D.C.
R. E. Glover.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price $0.50. Engineering Monograph No. 31, 1966. 76 p, 22 fig, 5 tab, 32 ref.

Descriptors: *Groundwater, *Aquifer, *Drawdown, *Permeability, Irrigation water, Artesian well, *Canal seepage, New Mexico, Rio Grande River.
Identifiers: *Dupuit-Forchheimer equations, Laplace equations, Mesilla Valley, Bank storage.

Analyses are presented of a variety of groundwater problems encountered in the planning and development of Bureau of Reclamation water resources projects in the western United States including depletion caused by pumping, estimates of seepages, computation of return flows, analysis of drawdown, and estimates of permeabilities for selection of pump capacities. The solutions to the problems stated are generally based upon the Dupuit-Forchheimer idealization, which is justified only where the water table gradients are small compared to unity and the changes of groundwater level are small compared to the original saturated depth in the aquifer. The theoretical assumptions and limitations are outlined and specific problems are computed through the use of charts, tables and the solution of equations derived from the theoretical considerations. Some comparisons of observed and computed values are presented to judge the effectiveness of the method of solution. (Campbell-NWWA)
W74-03142

GROUND WATER IN THAILAND,
Department of Public Works, Bangkok (Thailand). Provincial Water Supply Div.
K. Anambutr.
Paper presented at National Water Well Association International Groundwater Symposium, November 20-22, 1973, Macquarie University, Sydney, Australia. 5 p, 3 ref.

Descriptors: *Groundwater, *Planning, Feasibility, Water resources development, *Water yield, *Aquifer characteristics, Water table aquifers, Artesian aquifers, *Water quality.
Identifiers: *Thailand (Yom basin), Five-year plan.

The expansion of agriculture and industry, the rapid growth of population, and the desire to secure a higher standard of living have resulted in an increased use of water in Thailand and has placed a great emphasis on water resources development. The government of Thailand has defined a third 5-year plan for investment in the development of water resources for agriculture, industry, and domestic use. The groundwater potential of Thailand is described generally with respect to aquifer characteristics, water quality, and yields obtainable. Particular emphasis is placed on the groundwater objectives in the northern region of the country, which are as follows: To make a preliminary assessment of the groundwater resources; to identify the areas where groundwater might be extracted; to evolve criteria for groundwater development; to examine the feasibility of groundwater development; to recommend further studies necessary before large scale development of groundwater resources. (Campbell-NWWA)
W74-03150

DESIGNING FOR FUTURE EXPANSION--DEVELOPMENT OF GROUND WATER IN INDIA,
Uttar Pradesh Irrigation Dept., Lucknow (India).
N. C. Saksena.
Paper presented at National Water Well Association International Groundwater Symposium, November 20-22, 1973, Macquarie University, Sydney, Australia. 22 p, 8 fig, 9 ref.

Descriptors: *Groundwater, *Wells, Recharge, Alluvial aquifers, Water supply development, Water utilization, *Planning, *Groundwater resources, Canals, Irrigation.
Identifiers: *Tritium tracer studies, *India (Uttar Pradesh), Strainer wells, Cavity wells, Tubewells.

A rapidly expanding economy, together with revolutionary advances in agriculture, has brought into focus the necessity of accelerated development and utilization of all water potential in India, with particular emphasis on groundwater. Drought conditions laid further emphasis on the use of groundwater, and today there are more than 30,000 state-owned deep tubewells and half a million private shallow wells in operation in the country. The systematic development of groundwater in India is described along with design to meet the following future needs: Direct irrigation facilities in areas of arable land in arid regions; supplementing canal supplies through the entire length, or specifically at the tail end of canals; removing water-logging conditions and augmentation of supplies; creating groundwater storage areas; utilizing groundwater from surplus to deficit areas. The safe groundwater potential of the country available for development every year is estimated to be about 165 million acre ft., of which 81 million acre ft. has been developed as of 1972. (Hunt-NWWA)
W74-03151

MUTUAL INTERFERENCE OF WATER WELLS,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 08B.
W74-03154

SEISMIC-REFRACTION AND EARTH-RESISTIVITY INVESTIGATION OF HYDROGEOLOGIC PROBLEMS IN THE HUMBOLDT RIVER BASIN, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 02F.
W74-03155

STEADY AND UNSTEADY FLOW TOWARDS GRAVITY WELLS,
Abadan Inst. of Tech. (Iran).
M. A. Mahdaviani.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 93, No HY6, p 135-146, November, 1967. 10 fig, append.

Descriptors: *Wells, *Groundwater, *Permeability, *Drawdown, Aquifer, Hydraulics, Theis equation.
Identifiers: *Semiconfined flow, Theis formula, Free surface, *Gravity wells, Phreatic surface, Semiconfined aquifer.

Problems of semiconfined flow, such as the flow towards gravity wells, entail the difficult determination of the upper boundary known as the free surface. Rigorous solutions to such problems are usually too complex for practical use. This study seeks to establish a set of curves which relate the height of seepage surface of a gravity well to other geometric and physical characteristics of the surrounding aquifer, and to examine the problem of the lowering or raising of the phreatic surface around a gravity well after the well begins to operate. Results are highly satisfactory, showing that one can measure the permeability of an unconfined aquifer by constructing a well, pumping it out, and measuring the amount of draw-down of the well at two or three different times after the pumping has started. If the permeability of the aquifer is known, one can use the method outlined in this study to foresee the values of the drawdown at various points around the well at different times in semiconfined or unconfined aquifers. (Hunt-NWWA)
W74-03161

DEVELOPMENT IN DEEP SANDSTONE AQUIFER ALONG THE ILLINOIS RIVER IN LA SALLE COUNTY,
Illinois State Water Survey, Urbana.
L. R. Hoover, and R. J. Schicht.
Report of Investigation 59, 1967. 23 p, 25 fig, 10 tab, 18 ref.

Descriptors: Water resources development, Water resources, Water supply, *Water yield, *Aquifers, *Drawdown, Piezometry, Water level fluctuations, Groundwater, Wells, Recharge, *Illinois, Mathematical models, *Hydraulic properties, Water utilization, Sandstones.
Identifiers: *Well yield, Vertical leakage, Piezometric surface.

Large supplies of groundwater are developed from the Cambrian-Ordovician aquifer in La Salle County for municipal and industrial use. Yields of wells normally exceed 500 gpm. Recharge is from vertical leakage through confining beds in the glacial drift or overlying bedrock formations. As a result of heavy pumping the original slope of the piezometric surface has steepened, and water levels have declined more than 100 feet in pumping centers. Hydraulic properties of the aquifer and its confining bed were estimated from available data. Estimates of future nonpumping waterlevel declines in the aquifer were made from a model aquifer and mathematical model. This study provides data for planning and development of groundwater resources for the area. (Staplin-NWWA)
W74-03163

TERRADYNAMICS,
National Water Well Association, Houston, Tex., Research Facility.
For primary bibliographic entry see Field 08E.
W74-03165

COMPUTING THE BAROMETRIC EFFICIENCY OF A WELL,
Geological Survey, Aiken, S.C., Savannah River Plant.
For primary bibliographic entry see Field 08B.
W74-03167

SEALING ABANDONED WATER WELLS.
Illinois State Dept. of Mines and Minerals, Springfield. Div. of Oil and Gas.
For primary bibliographic entry see Field 08F.
W74-03169

ECONOMIC POLICY FOR WATER RESOURCES AND PLACEMENT FLOWS,
New Mexico Univ., Albuquerque. Dept. of Economics.
M. Gisser.
Natural Resources Journal, Vol 11, No 4, p 714-720, 1971. 3 fig, 6 ref.

Descriptors: *Overdraft, *Irrigation water, *Water allocation (Policy), Water supply, Water demand, Agriculture, Southwest U.S., Pumping, Water rates, Costs, Consumptive use, Water table, Optimization, Natural recharge, State governments, Aquifer management, *Water policy.
Identifiers: *Economic policy, Replacement flows.

'Overdraft' is a continuing problem in the southwestern U.S., creating falling water tables and rising pumping costs. Possible governmental economic policies to cope with the long-run supply and demand water problems are examined for two situations. In the first, with no water imported into the region, the government faces three policies: do nothing, retard the reduction in increased pumping cost and irrigation water prices, or regulate present water consumption. In the case of a minimal return flow the government may also determine the optimal pumping duration before the land is abandoned. The guiding principle in government policy choice is the maximization of the present value of future benefits. In the second case, water is imported into the region. The farmer chooses between local and imported water according to their respective costs. As a result of decreased usage, the water table increases with a consequent price decrease. This process can be expected to cause a continuous fluctuation in both price and the water table over time. Governmental interaction may come into play to stabilize this fluctuation. If the depth of irrigation wells is widely distributed among farms, stability may arise naturally and regulation would not be required. (Schroeder-Wisconsin)
W74-03191

WELLS AND WELFARE. AN EXPLORATORY COST-BENEFIT STUDY OF THE ECONOMICS OF SMALL-SCALE IRRIGATION IN MAHARASHTRA,
Organization for Economic Co-Operation and Development, Paris (France). Development Centre.
For primary bibliographic entry see Field 06B.
W74-03192

4C. Effects on Water of Man's Non-Water Activities

MODEL FOR LANDSCAPE RESOURCE ASSESSMENT, PART I OF THE 'METROPOLITAN LANDSCAPE PLANNING MODEL' (METLAND),
Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional Planning.
For primary bibliographic entry see Field 06B.
W74-02657

PROCESSES, PROCEDURES, AND METHODS TO CONTROL POLLUTION RESULTING FROM SILVICULTURAL ACTIVITIES.
Environmental Protection Agency, Washington, D.C. Office of Air and Water Programs.

For primary bibliographic entry see Field 05G.
W74-02946

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR MODIFICATION OF A BOAT DOCK AND RAMP.
Renton City Planning Dept., Wash.
For primary bibliographic entry see Field 06G.
W74-03124

FOREST MANAGEMENT ON THE WATERSHED,
Portsmouth Water Dept., Va.
P. J. Brady, and J. J. Jones.
Journal of the American Water Works Association, Vol 65, No 11, p 701-703, November, 1973. 2 photos.

Descriptors: *Forest management, *Watershed management, *Forest watersheds, Lumbering, Forests, *Virginia, Swamps, 2-4-5-T, Water quality control, Wildlife management, Deciduous trees, Chlorinated hydrocarbon pesticides.
Identifiers: Portsmouth (Va.), Nansemond River (Va.).

The Portsmouth Virginia Water Department manages the forests on its 58-square mile water supply watershed, in an attempt to improve water quality and profitability of the land. The watershed consists of 3,285 acres, including 1,683 acres flooded by four lakes which are impoundments of the Nansemond River. The raw water, referred to as swamp water, has a low pH of 6.0 and a color reading of 300, results of 100 acres of cypress in the water and deciduous trees, mostly oak and gum, in the watershed. Leaves from the trees cause odor, color, stagnation, clogging of screens, algae, aquatic plants, and animal life. Ten years ago, the Water Department began eliminating some deciduous trees by girdling and applying 2-4-5-T, an herbicide. The method of application is described in detail. Pines, cedars, poplars, holly, and dogwood were left standing. Loblolly pines or cedars were planted in the treated area. Although improvement in water quality is difficult to measure, raw water quality is said to be better and easier to treat than 10 years ago. In the past 4 years, lime, alum, and carbon usage for water treatment has been unchanged, but copper sulfate and chlorine use has dropped. Biologists claim that cut and replanted areas increase the population of most game species. The timbering operation produces a modest profit. (Stein - North Carolina)
W74-03129

4D. Watershed Protection

PLANT SPECIES AS WILDLIFE COVER AND EROSION CONTROL ON 'MUDFLATS' IN IOWA'S LAREG RESERVOIR SYSTEMS,
Iowa State Univ., Ames. Dept. of Botany and Plant Pathology.
J. A. Wilson, and R. Q. Landers.
Available from the National Technical Information Service as PB-226 347 $3.75 in paper copy, $1.45 in microfiche. Iowa State University Water Resources Research Institute Report, ISWRRI-51, July 30, 1973. 10 p, 32 fig. OWRR A-039-IA (3).

Descriptors: *Erosion control, *Mudflats, *Vegetation, *Iowa, Floods, Water level fluctuations, Plant growth, Projects, Plant morphology, Plant physiology, Planting management, Trees, Flood control, Reservoirs, Photography, Data collections, Evaluation.

In recent years, several flood control reservoirs have been built in Iowa, and other are in various stages of planning or construction. This research project was initiated July 1, 1970, to (1) examine the natural establishment of plant species in shallow water and on recently exposed mudflats following the annual release of floodwaters in Iowa's large reservoir systems, and (2) determine suitable species for establishment as wildlife cover and for erosion control. The development of vegetation along a relatively stable shoreline in Iowa contrasts sharply with that in reservoir flood pools. The shoreline of the Lake MacBride subimpoundment of the Coralville Reservoir is well vegetated. This esthetically pleasant area has relatively little soil erosion and provides manageable natural areas for man and wildlife. On the other hand, the impact of extreme fluctuations in the water level of the Coralville flood pool is strikingly visible. Dead standing trees, spectral remnants of the original forest, dominate the upper reaches of the flood pool landscape. Mud and debris characterize the area immediately following the recession of floodwaters. (Woodard-USGS)
W74-02666

VEGETATION OF THE MISSOURI RIVER FLOODPLAIN IN NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Botany.
For primary bibliographic entry see Field 02I.
W74-02667

RIVER BASIN AUTHORIZATIONS AND RELATED WATER RESOURCE PROJECTS.
For primary bibliographic entry see Field 04A.
W74-02781

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

AN ANALYTICAL METHOD FOR TOTAL HEAVY METAL COMPLEXING AGENTS IN WATER AND ITS APPLICATION TO WATER QUALITY STUDIES,
Missouri Water Resources Research Center, Columbia.
M. J. Smith, D. Jones, S. Harlan, R. Kunkel, and S. E. Manahan.
Available from the National Technical Information Service as PB-226 322 $2.75 in paper copy, $1.45 in microfiche. Completion Report, August 27, 1973. 14 p, 1 fig, 1 tab, 4 ref. OWRR A-056-MO (1). 14-31-0001-3825.

Descriptors: *Heavy metals, *Chelation, Water pollution, Mining, Analytical techniques, Pollutant identification, *Copper, *Ion exchange.
Identifiers: *Atomic absorption analysis, *Chelating agents.

Several methods of analysis were developed for low levels of complexing agents, particularly chelating agents. These species are very important in water quality. It is only very recently that their importance has become very apparent in areas such as heavy metal transport, algal growth, and toxicity of heavy metals. The first method developed was an atomic absorption analysis of strong heavy metal chelating agents. This method is based upon the fact that when copper ion is added to a water sample and the pH adjusted to 10, the only copper that remains in solution is that which is in a complexed or chelated form. In the final few weeks of the project, a new method was developed in which the copper is solublized from a copper-containing chelating ion exchange resin.
W74-02658

THE IDENTIFICATION AND MEASUREMENT OF CHLORINATED HYDROCARBON PESTICIDES ACCUMULATED FROM URBAN RUNOFF,
Tulsa City--County Health Dept., Okla.
J. L. Norton.
Available from the National Technical Information Service as PB-226 307 $3.00 in paper copy, $1.45 in microfiche. Oklahoma Water Resources Research Institute, Stillwater. Final Technical Completion Report, July 1973. 29 p, 2 fig, 9 tab, 10 ref. OWRR B-013-Okla (3).

Descriptors: *Water pollution sources, *Chlorinated hydrocarbon pesticides, *Pollutant identification, *Oklahoma, River basins, Storm runoff, Chemical analysis, Heavy metals, Lead, Chromium, Data collections, Sampling, Water quality, Analytical techniques.
Identifiers: *Arkansas River (Okla), *Tulsa (Okla).

A total of 198 samples of runoff and Arkansas River water were collected in the metropolitan area of Tulsa, Oklahoma, and analyzed for chlorinated hydrocarbon pesticides from March 1970 through June 1972. Sampling at 15 different sites was conducted in three phases: (1) Arkansas River water above and below the metropolitan area, (2) storm drainage basins at maintenance flow, and (3) storm-water runoff. Pesticides identified entering the river from drainage basin outfalls at some time during the project include lindane, heptachlor, heptachlor epoxide, aldrin, and dieldrin. A supplementary investigation of heavy metals in storm-water runoff identified lead and chromium entering the Arkansas River from drainage basin outfalls. (Woodard-USGS)
W74-02665

ELECTRON MICROSCOPIC INVESTIGATION OF NATURAL BACTERIAL POPULATIONS IN THE WATER AND SEDIMENT OF LAKE BALATON AND LAKE BELSO,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
Janos Olah, Lajos Hajdu, and Karoly Elekes.
Ann Inst Biol (Tihany) Hung Acad Sci. 39: 123-129, Illus, 1972.
Identifiers: *Bacterial populations, *Electron microscopy, *Hungary (Lake Balaton-Lake Belso), Lakes, *Lake sediments.

Electron microscopic examination of grids exposed in lake water shows that in Lake Balaton (Hungary) the microbial communities are poor in forms, short rods and ovoid cells are the dominating elements, as opposed to the water of Lake Belso in which the microbial communities are composed of more diverse morphological types. An organism similar to Metallogenium was frequently encountered in the bottom water of Lake Belso. Rod-like forms were dominant in the mud of both lakes during the period of examination. Three very small organisms of unusual shape, consisting of a head and a tail-part were described. On the basis of their morphology, and size they are most probably Mycoplasm-like organisms. In connection with the studies on the structure of microbial communities, the various types of population formation, the signs indicative of intensive growth and decrease of population, the various types of colony formation and the relationship between seston and microorganisms examined.--Copyright 1973, Biological Abstracts, Inc.
W74-02725

DETERMINATION OF THE ASSOCIATION AND DISSOCIATION OF HUMIC ACID FRACTIONS BY SMALL ANGLE X-RAY SCATTERING,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 02K.
W74-02730

FLUORESCENT SPECTROSCOPY, A TECHNIQUE FOR CHARACTERIZING SURFACE FILMS,
Geological Survey, Lakewood, Colo.
M. C. Goldberg, and D. H. Davonald, III.

Journal of Research of the U S Geological Survey, Vol 1, No 6, p 709-717, November-December 1973. 15 fig, 2 tab, 20 ref.

Descriptors: *Remote sensing, *Pollutant identification, *Fluorescence, *Spectroscopy, *Films, Evaporation, Water pollution, Analytical techniques.
Identifiers: Fluorescent spectroscopy.

Fluorescent spectra obtained by using a light path through the liquid solution and the fluorescent spectra obtained by a direct reading of surface reflection were studied for use in remote sensing. A brief review of quantum fundamentals provides the necessary information to conclude that transmitted and reflectance spectra are identical in wavelength response. Many floating films contain fluorescent materials; thus fluorescent spectroscopic techniques may be used to obtain the fluorescent spectra of lube oil, crude oil, and lignosulfonic acid to detect, identify, and quantify these representative fluorescent materials in water solutions. For each material tested the emission maximum was established. The emission maxium was then held constant while the absorption spectrum was recorded and the absorption maximum established. The complete spectral curves are presented. (Knapp-USGS)
W74-02731

INSTRUMENTAL ANALYSIS OF CHEMICAL POLLUTANTS--TRAINING MANUAL.
Environmental Protection Agency, Washington, D.C. Water Quality Office.

Available from NTIS, Springfield, Va 22151, as PB-214 504 Price $3.00 printed copy; $1.45 microfiche. Report, April 1971. 285 p.

Descriptors: *Chemical analysis, *Pollutant identification, *Analytical techniques, Schools (Education), *Training, Environmental control, Scientific personnel, Water analysis, Methodology, *Instrumentation, Water quality, Water pollution sources.
Identifiers: Instrumental analysis, Chemical pollutants, Training manual.

This manual was prepared for reference use of students enrolled in scheduled training courses of the Water Quality Office, Environmental Protection Agency. The course is designed for analytical chemists and others having technical responsibility for the collection, identification and measurement of organic and inorganic pollutants in the aquatic environment. The objectives of the Training Program are to provide specialized training in the field of water pollution control which will lead to rapid application of new research findings through updating of skills of technical and professional personnel, and to train new employees recruited from other professional or technical areas in the special skills required. Chromatographic methodology and optical methods (radiation) of analysis are described. (Woodard-USGS)
W74-02739

DETERMINATION OF FURFURAL IN WATER AND ASPHALT (IN POLISH),
J. Kelus, and K. Wawiernia.
Rocz Panstw Zakl Hig, Vol 23, No 1, p 1-6, 1972, Illus, English summary.
Identifiers: *Asphalt, *Colorimetry, *Furfural, *Spectrophotometry, Iron, Pollutant identification.

Colorimetric and spectrophotometric methods were applied for the determination of furfural levels in water and in the chloroform solutions of asphalt. With available instrumentation a visual colorimetry using aniline solutions in glacial acetic acid proved the most sensitive method of study. In this method Fe was an interfering factor, even in the concentration of 0.1 mg/l. When Fe was present, the furfural determination was done in distillate.--Copyright 1973, Biological Abstracts, Inc.
W74-02798

CHEMICAL QUALITY OF SURFACE AND SEDIMENT PORE WATER IN LOUISIANA AND MISSISSIPPI ESTUARIES,
Louisiana State Univ., New Oreleans.
J. O. Snowden, and E. G. Otvos.
Available from the National Technical Information Service as PB-226 568 $3.50 in paper copy, $1.45 in microfiche. Louisiana State University, Baton Rouge Water Resources Research Institute Completion Report, October 1973. 56 p, 28 fig, 5 tab, 41 ref. OWRR B-009-LA (1).

Descriptors: *Water pollution, *Sediment-water interfaces, Pore water, *Water quality, Water temperature, *Physicochemical properties, Chlorides, Salinity, Organic compounds, Clay minerals, *Hydrogen ion concentration, *Oxidation-reduction potential, Estuaries, Pollutant identification.
Identifiers: Pearl River, Wolf River (Miss), Pascagoula River (Miss), Graveline Bayou (Miss), Ocean Springs (Miss).

The Pearl and Pascagoula Rivers and other smaller streams that empty into Mississippi Sound vary greatly in seasonal water chemistry, as is typical of fresh water dominated estuaries. The water quality in these estuaries is generally good, but the larger rivers, especially the Pearl River, show indications of chemical pollution. The nitrate concentrations in Pearl River, although well below the maximum allowed for municipal water supplies, are higher than the regional average and about the same as for the Mississippi River, which has well-known pollution problems. During times of maximum fresh water runoff, the Pascagoula River also had higher than normal nitrate concentrations. A short stretch of the Escatawpa River, a tributary to the Pascagoula River, showed chronic signs of chemical and organic pollution. The bottom sediments in all the estuaries are active ion exchangers, as shown by variations in the major ion ratios below the sediment-water interface. Ion concentration, ion type, and clay mineralogy influence ion exchange. Recent research has shown that other reactions, especially sulfate reduction, may affect interstitial concentrations of calcium and, perhaps, other metal ions. Because above-normal nitrate concentrations usually indicate other types of pollution, the nitrate sources in the Pearl and Pascagoula Rivers should be identified, and the supply, if possible, be reduced. Future land and industrial development along all these estuaries should be carefully planned to protect the water quality.
W74-02825

APPLICATION OF ALGAL BIOASSAYS IN EUTROPHICATION ANALYSES,
National Inst. for Water Research, Pretoria (South Africa).
For primary bibliographic entry see Field 05C.
W74-02907

DETERMINATION OF POLYACRYLAMIDE IN THE DRINKING WATER BY MEANS OF AN ADSORPTION PHOTOMETRIC METHOD, (IN RUSSIAN),
Yu. A. Klyachko, N. V. Mikhailova, and Yu. I. Veitser.
Gig Sanit. Vol 36, No 11, p 77-80. 1971. Illus.
Identifiers: Adsorption photometric method, *Polyacrylamide, *Pollutant identification, *Potable water.

Observed was the suitability of an adsorption photometric method with help of methylene blue for the determination of the presence of polyacrylamide in the drinking water. The ability of polyamine absorbed by CaCO3 to show complex combinations with methyl blue or other coloring cations was utilized.--Copyright 1973, Biological Abstracts, Inc.
W74-02932

RESPIRATION RATES OF SOME NEW ZEALAND ECHINODERMS (NOTE),
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
W. S. Johnson.
New Zealand Journal of Marine and Freshwater Research, Vol 7, Nos. 1-2, p 165-169, June 1973. 1 fig, 2 tab, 9 ref.

Descriptors: *Respiration, *Bioassay, Oxygen, Methodology.
Identifiers: *Echinoderms, Evechinus chloroticus, Goniocidaris umbraculum, Coscinasterias calamaria, Pentagonaster pulchellus, Ion selective electrodes, *New Zealand, Macroinvertebrates, Sea stars.

Respiratory rates were measured in four common New Zealand echinoderms, Evechinus chloroticus and Goniocidaris umbraculum (Echinoidea), and Coscinasterias calamaria and Pentagonaster pulchellus (Asteroidea). The organisms, collected from Otago Harbour and Blueskin Bay, were maintained in running sea water until their guts were cleared. Single animals were placed in air-tight containers filled with air-saturated seawater, and the oxygen tension measured to the nearest 0.01 ppm at hourly intervals with a polarographic oxygen electrode. All experiments were terminated when oxygen tension reached 50 percent saturation. The respiratory rates at 12C ranged from 3.8 to 9.8 microliters 02/h/g (live weight). The rates for Evechinus and Coscinasterias fall well within the range of metabolic rates of other echinoids and asteroids. Goniocidaris and Pentagonaster have relatively low respiratory rates. (Little-Battelle)
W74-02949

DESCRIPTION AND ECOLOGY OF THREE STENONEMA MAYFLY NYMPHS,
National Environmental Research Center, Cincinnati, Ohio. Analytical Quality Control Lab.
P. A. Lewis.
Offprint from: Proceedings of the First International Conference on Ephemeroptera, August 12-20, 1970, Tallahassee, Florida, Florida A and M University, p 57-72. 4 fig, 1 tab, 37 ref.

Descriptors: *Mayflies, *Immature growth stage, *Ecological distribution, Aquatic insects, Systematics, Speciation, Water quality, Sampling, Ecology, Dissolved oxygen, Water temperature, Hydrogen ion concentration, Dissolved solids, Phosphorus, *Ohio River, Natural streams.
Identifiers: *Nymphs, *Insect morphology, Stenonema scitulum, Stenonema terminatum, Stenonema integrum, Animal morphology, *Scioto River (Ohio), Sample preservation.

Three previously underscribed mayfly nymphs (Stenonema scitulum, S. terminatum and S. integrum) were collected from the Ohio and Scioto Rivers and from natural substrates in small streams in the Ohio Basin. The nymphs were reared in tanks to the adult stage and the subimaginal skins, nymphal exuviae and nymphs were preserved in 70 percent ethanol. Complete descriptions are given for the three species of nymphs. (Holoman-Battelle)
W74-02953

CHEMICAL CHARACTERISTICS, BACTERIAL COUNTS, AND POTENTIAL SHELF-LIFE OF SHRIMP FROM VARIOUS LOCATIONS ON THE NORTHWESTERN GULF OF MEXICO,
Texas A and M Univ., College Station. Dept. of Animal Science.
B. F. Cobb, III, C. Vanderzant, C. A. Thompson, Jr., and C. S. Custer.

Journal of Milk and Food Technology, Vol 36, No 9, p 463-468, September 1973. 6 tab, 9 ref.

Descriptors: *Shrimp, *Chemical analysis, *Odor, *Microbial degradation, Nitrogen, Bacteria, Foods, Storage, Hydrogen ion concentration, *Gulf of Mexico.
Identifiers: Biological samples, *Spoilage, Sample preparation, Penaeus setiferus, Penaeus aztecus.

Because of the variation in microbiological characteristics of different waters and consequent spoilage patterns in shrimp, amino nitrogen (AA-N), ammonia, total volatile nitrogen (TVN), trimethylamine nitrogen (TMN), bacterial content, and pH were evaluated as means of measuring spoilage and shelf-life of shrimp. Freshly harvested white shrimp (Penaeus setiferus) from 13 locations on the northwestern coastline of the Gulf of Mexico and brown shrimp (P. aztecus) from 3 water depths near Port Aransas, Texas, and from a commercial fishing boat were placed on steril ice, allowed to spoil, and examined. Samples for chemical analysis were homogenized with trichloroacetic acid and centrifuged. Both TVN and AA-N varied considerably from sample to sample and did not show a consistent pattern of change during iced storage. TMN production was evident in boat-shrimp samples with high TVN levels. Bacterial counts of fresh shrimp did not exceed 10,000/g. Nine of the 10 boat-shrimp samples had counts in excess of 1 million/g. Counts of samples spoiled on sterile ice range from 2 million-10 billion/g. The ratio TVN/AA-N may be useful in conjunction with appearance and odor as a measure of spoilage. Samples with TVN/AA-N greater than 1.3 mg N/millimole were evaluated as poor. Maximum potential shelf-life of boat-shrimp was reduced 0-15 days by handling and storage. (Little-Battelle)
W74-02955

SOME ASPECTS OF THE BIOLOGY OF CALLIOPIUS LAEVIUSCULUS (KROYER) (CRUSTACEA, AMPHIPODA) IN THE NORTHWESTERN ATLANTIC,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-02958

EXPERIMENTAL ECOLOGICAL INVESTIGATIONS OF CHIRONOMUS THUMMI AND CHIRONOMUS PIGER (DIPTERA, CHIRONOMIDAE). (EXPERIMENTELL--OKOLOGISHE UNTERSUCHUNGEN AN CHIRONOMUS THUMMI UND CHIRONOMUS PIGER (DIPTERA, CHIRONOMIDAE),
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany). Dept of Tropical Ecology.
For primary bibliographic entry see Field 05C.
W74-02963

NATURAL HABITAT OF CARYOPHANON LATUM,
Mount Allison Univ., Sackville (New Brunswick). Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-02966

MICRODILUTION ANTIBIOTIC SUSCEPTIBILITY TEST: EXAMINATION OF CERTAIN VARIABLES,
Connecticut Univ. Helth Center, Farmington.
R. C. Tilton, L. Lieberman, and E. H. Gerlach.
Applied Microbiology, Vol 26, No 5, p 658-665, November 1973. 1 fig, 8 tab, 19 ref.

Descriptors: *Resistance, *Antibiotics (Pesticides), E. coli, Methodology, Cultures, Inhibition, Toxicity, Pesticide toxicity.
Identifiers: *Antibiotic dilution tests, Staphylococcus aureus, Pseudomonas aeruginosa, Minimum inhibitory concentrations, Culture media, Ampicillim, Carbenicillin, Cephalothin, Chloramphenicol, Clindamycin, Colistin, Erythromycin, Gentamicin, Kanamycin, Methicillin, Penicillin, Tetracycline.

A semiautomated microdilution susceptibility test is described. The effect of certain parameters such as inoculum size, growth media, incubation conditions, and inoculum dispensing systems was studied with E. coli, Staphylococcus aureus, and Pseudomonas aeruginosa. Both medium type and inoculum size caused significant variations in the minimum inhibitory concentrations (MIC) of certain antibiotic-organism combinations. No effect on MIC was observed as a function of incubator type. Efforts to read a reproducible MIC value in less than 12 h failed. A commercially available wire pronged inoculator was determined to be inaccurate and unsafe. Disposable dropper pipettes proved to be economical, accurate, and precise. Although a standard method for microdilution antibiotic susceptibility testing is not proposed, data are presented which show that future attempts at standardized procedures are mandatory if inter- and intralaboratory reliability is desired. (Little-Battelle)
W74-02968

APPLICABILITY OF THE REVERSE-FLOW FILTER TECHNIQUE TO MARINE MICROBIAL STUDIES,
Oregon State Univ., Corvallis. Dept. of Microbiology.
R. P. Griffiths, F. J. Hanus, and R. Y. Morita.
Applied Microbiology, Vol 26, No 5, p 687-691, November 1973. 4 tab, 7 ref.

Descriptors: *Marine bacteria, *Separation techniques, Cultures, Radioactivity techniques, Sea water, Biomass, Absorption.
Identifiers: *Reverse-flow filtration, *Preconcentration, *Method validation, Sample preparation, Recovery, Accuracy, *Vibrio marinus.

The validity of using the reverse-flow filtration technique to quantitatively concentrate marine bacteria was evaluated with both a pure culture of Vibrio marinus and seawater samples. After filtration, the volume of the filtrate and the combined concentrates were measured to determine the concentration factor. Analyses were made on all fractions. Colony forming units (CFU) in the various fractions and in unfiltered samples were determined by the spread-plate technique using Lib-X medium. Total substrate uptake was determined by assaying for C-14 with labeled glutamate, and biomass was determined with C-14-labeled proline. Assay of biomass in the concentrate, filtrate, membrane filter, and filter washings showed that essentially no concentration occurred, and most of the bacteria remained on the filter. Furthermore data indicate that cells were altered during the filtration procedure. Since the number of cells lost on the filter is significant and inconsistent they cannot be represented by a constant. Consequently, results obtained by this procedure should be interpreted with caution. (Little-Battelle)
W74-02971

PATTERNS OF RADIOCARBON UPTAKE BY A THERMOPHILIC BLUE-GREEN ALGA UNDER VARYING CONDITIONS OF INCUBATION,
Queens Coll., Flushing, N.Y. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-02972

DECOMPOSITION OF MARINE COPEPODS,
Dalhousie Univ., Halifax (Nova Scotia). Inst. of Oceanography.
G. C. H. Harding.
Limnology and Oceanography, Vol 18, No 4, p 670-673, July 1973. 1 fig, 1 tab, 9 ref.

Descriptors: *Biodegradation, *Sampling, *Copepods, *Sea water, Bacteria, Water temperature, Laboratory tests.
Identifiers: *Calanus finmarchicus.

As the first step in establishing the proportion of net damaged to dead copepods in plankton tows, experiments were conducted to investigate the rate of decomposition of dead animals. Samples of Calanus finmarchicus, which had been killed by suffocation, were sealed in 30-ml vials containing Halifax water at 4 C or Sargasso Sea water at 22 C. Additional tests were conducted in which Calanus were sterilized by gamma radiation or autoclaving. The irradiated calanus were also incubated at 20-22 C in seawater filtered through a 0.22-micron filter. One vial of each series was opened at 24-hour intervals, until decomposition and the carcases stained for bacteria with carbol thionin. The material was stained on a 0.45-micron filter which was later mounted in Permount on a glass slide. Rod-shaped bacteria decomposed dead Calanus within 11 days in 4 C Halifax water and within 3 days in 22 C Sargasso Sea water. In both cases initial infection occurred on the exoskeleton and apparently progressed into the organisms through the mouth. The urosome and internal extremities were the last to be attacked. Samples in filtered seawater were covered with small coccoid bacteria after 49 days, but copepod tissues were all distinguishable. Collection of surface corpses by net is thought to be impossible after the first day of death in subtropical waters and beyond the sixth day in temperate coastal waters. (Little-Battelle)
W74-02973

METHOD FOR THE SELECTIVE ENUMERATION OF BLUE-GREEN BACTERIA IN WATER,
H. D. McCurdy, Jr., and W. F. Hodgson.
Applied Microbiology, Vol 26, No 5, p 682-686, November 1973. 1 fig, 9 tab, 3 ref.

Descriptors: *Pollutant identification, *Aquatic bacteria, *Cyanophyta, *Aquatic algae, *Selectivity, Methodology, Separation techniques, Isolation, Temperature, Cultures, Anabaena, Chlorophyta, Antibiotics (Pesticides), Water sampling, Surface waters, Lake Erie.
Identifiers: *Membrane filters, Enumeration, Prokaryotes, Culturing techniques, Eukaryotes, Reproducibility, Cycloheximide, Anacystis nidulans, Axenic cultures, Growth media, Cedar Creek, Detroit River, Sales Pond, Dump Pond, Canard River, Point Pelee Marsh, Heterotrophic bacteria, Gleocapsa alpicola, Choroglea fritschii, Plectonema, Scenedesmus quadricauda, Chlorella vulgaris, Chlamydomonas reinhardtii.

A member filter method for the selective enumeration of blue-green bacteria has been developed which, on the basis of studies with laboratory cultures and field tests, has proved to be both practical and reproducible. The filters are incubated under specified conditions of temperature and illumination on a mineral salts agar medium supplemented with yeast extract and containing cycloheximide to eliminate eukaryotic contaminants. (Holoman-Battelle)
W74-02974

LIPOLYTIC BACTERIA IN THE OTTAWA RIVER,
Ottawa Univ. (Ontario). Dept. of Biology.
C. R. Blaise, and J. B. Armstrong.
Applied Microbiology, Vol 26, No 5, p 733-740, November 1973. 4 fig, 5 tab, 30 ref.

Descriptors: *Aquatic bacteria, *Isolation, Water temperature, Water pollution, Biological properties, Lipids, Bioindicators, Water sampling, Pseudomonas, Aerobic bacteria, Streptococcus, *Canada.
Identifiers: *Lipolytic bacteria, *Biochemical characteristics, Substrate utilization, *Ottawa

River, Psychrophilic bacteria, Mesophilic bacteria, Biochemical tests, Acinetobacter, Moraxella, Brewery Creek, Aeromonas, Vibrio, Alcaligenes, Chromobacterium, Enterobacteriaceae, Gram-negative bacteria, Gram-positive bacteria, Pseudomonas fluorescens, Pseudomonas putida.

Lipolytic bacteria was isolated from two stations on Brewery Creek, an arm of the Ottawa River, during the winter of 1971-72. Total counts were approximately sevenfold higher at the more polluted downstream station, whereas lipolytic counts were about 100-fold higher. At this station, significantly more lipolytic bacteria grew on plates incubated at 20 C than at 4 C, suggesting that the population was comprised of both mesophiles and psychrophiles. However, at the upstream station, approximately the same number were obtained at both temperatures. A total of 434 isolates, mainly from the downstream station, were tentatively classified. The major groups were Pseudomonas, Acinetobacter-Moraxella, and Aeromonas. Though the total number of lipolytic bacteria was fairly constant throughout the winter, the relative abundance of the acinetobacters dropped from approximately 90 percent in November to less than 10 percent in March, and then increased. The aeromonads and pseudomonads showed the opposite trend. Most of the bacteria, though isolated at 4 C, also grew at 30 C. Lipolysis, however, was generally strongest at 20 C or below. (Holoman-Battelle)
W74-02975

A PORTABLE APPARATUS FOR MEASURING RELATIVE GAS VACUOLATION, THE STRENGTH OF GAS VACUOLES, AND TURGOR PRESSURE IN PLANKTONIC BLUE-GREEN ALGAE AND BACTERIA,
California Univ., Berkeley. Dept. of Botany.
A. E. Walsby.
Limnology and Oceanography, Vol 18, No 4, p 653-658, July 1973. 4 fig, 12 ref.

Descriptors: *Cyanophyta, *Mechanical equipment, *Bacteria, Instrumentation, Cytological studies, Costs, Design.
Identifiers: *Gas vacuolation, Turgor pressure.

An apparatus developed to measure gas vacuolation, strength of gas vacuoles, and cell turgor pressure in blue-green algae and bacteria is based on the finding that a quasi-quantitative estimate of gas vacuoles can be obtained from the decrease in turbidity when gas vacuoles are collapsed by application of pressure. The apparatus comprises three main parts: a cylinder of compressed gas connected to a gas inlet system with a guage to monitor the pressure, which is connected to a pressure-resistant glass nephelometer tube housed in a nephelometer; and a battery-powered millivolt meter with amplifier, monitoring the output of the nephelometer photocell. Readings are made by admitting gas in steps of 50 kN/sq m to a final pressure of 1.4 MN/sq m and recording turbidity at each step. Cell turgor pressure is determined with a second sample containing sucrose solution at a concentration of 0.5 M. The pressure required to collapse the vacuoles is equal to the cell turgor pressure. The relative degree of gas vacuolation can be estimated from the ratio delta T sub a to T sub c, where delta T sub a is the change in turbidity when all vacuoles are collapsed and T sub c is the turbidity due to the cells remaining after collapsing all gas vacuoles. The equipment is portable and costs about 560 dollars for parts. (Little-Battelle)
W74-02976

COMPUTERIZED DIGITAL DATA ACQUISITION SYSTEM FOR THERMOGRAVIMETRY AND SIMILAR APPLICATIONS,
General Electric Corporate Research and Development, Schenectady, N.Y.
For primary bibliographic entry see Field 02K.
W74-02977

COMPUTER ANALYSIS OF DATA FROM POTENTIOMETRIC TITRATIONS USING ION-SELECTIVE INDICATOR ELECTRODES,
Hawaii Univ., Honolulu. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-02978

EVALUATION OF THE FERRIC ION SENSITIVE CHALCOGENIDE GLASS ELECTRODE,
Texas Instruments Inc., Dallas.
R. Jasinski, and I. Trachtenberg.
Journal of the Electrochemical Society, Vol 120, No 9, p 1169-1174, September 1973. 2 fig, 4 tab, 5 ref.

Descriptors: *Iron, *Aqueous solutions, Electrolytes, Monitoring, Industrial wastes, Water analysis, Electrochemistry, *Electrodes.
Identifiers: *Ion selective electrodes, *Detection limits, *Ferric ions, Chalcogenide glass, Sample preparation, Glass electrodes.

Further information is presented on the preparation, composition, performance, and ferric ion sensing mechanism of chalcogenide glass FenSe60Ge28Sb12 (where n falls between 1.3 and 2). Properly prepared and activated electrodes responded to changes in ferric ion concentration in perchlorate, chloride, and nitrate solutions with an average Nernstian slope of 57.6 plus or minus 2.9 mV/decade, over the concentration range of 0.01-00001 M ferric ion based on 16 electrodes). Useful response is found down to at least 0.000001 M Fe (3 plus). Details are presented on the activation and operating procedures. Although a complete evaluation of the sensing mechanism has not been made, it has been established that the activation process involves both an oxidation of the fresh surface as well as a chemical interaction of this surface with ferric iron from solution. The sensing process then involves exchange of ferric iron with this modified surface. (Little-Battelle)
W74-02984

THE PRESENCE OF CLOSTRIDIUM BOTULINUM IN INDONESIAN WATERS,
National Atomic Energy Agency, Djakarta (Indonesia). Pasar Djumat Research Centre.
J. W. Mortojudo, E. G. Siagian, F. Suhadi, B. Q. Ward, and W. M. S. Ward.
Journal of Applied Bacteriology, Vol 36, No 3, p 437-440, September 1973. 2 tab, 4 ref.

Descriptors: *Pollutant identification, *Sediments, *Marine animals, Sampling, Muds, Sands, Gravels, Snails, Oysters, Crabs, Shrimp, Marine fish, Cultures.
Identifiers: *Clostridium botulinum, Scallops, Sea slugs, Limpets, Starfish, Octopus, Biological samples, *Indonesia.

Samples of mud, sand, coral, gravel, snails, scallops, oysters, sea slugs, crabs, limpets, shrimps, starfish, octopus, and 13 species of bony fish were collected from Java and Bali and examined for Clostridium botulinum. The organism was detected in 10 percent of all enrichment cultures tested with types A and C predominating. (Little-Battelle)
W74-02986

THE MICROBIAL ASSOCIATIONS DEVELOPING ON EXPERIMENTAL TRICKLING FILTERS IRRIGATED WITH DOMESTIC SEWAGE,
Bath Univ. (England). School of Biological Sciences.
N. A. Halls, and R. G. Board.
Journal of Applied Bacteriology, Vol 36, No 3, p 465-474, September 1973. 3 fig, 3 tab, 42 ref.

Descriptors: *Sampling, *Sewage bacteria, *Dominant organisms, *Separation techniques, *Trickling filters, Cultures, Sewage treatment, Systematics, Isolation.
Identifiers: *Acinetobacter, Culture media, Alcaligenes, Bacillus, Pseudomonas putida.

Organisms in trickling filters were sampled by pumping waste from a sewage treatment plant through rotating Perspex tubes with roughened inside surfaces. The biological films were collected by plugging one end of the tubes, adding Ringer's solution and glass beads, plugging the open end of the tube, and shaking to dislodge the film. Disrupted films were cultured for 5 days and tested by Gram staining, by the oxidase test, and for motility, carbohydrate breakdown, and gelatin hydrolysis. The bacterial flora of the film which developed on experimental trickling filters irrigated with domestic sewage was dominated by Acinetobacter and yellow-pigmented Gram negative rod-shaped organisms and it was deduced that purification in certain aerobic waste treatment processes may depend upon an associated of these 2 organisms. Further evaluation of the operational procedures likely to have a selective influence on the microbial association which becomes dominant was made in studies using synthetic sewage. (Little-Battelle)
W74-02987

ESCHERICHIA COLI SEROGROUPS ISOLATED FROM STREAMS IN PENNSYLVANIA, 1965 TO 1972,
Pennsylvania State Univ., University Park. Dept. of Veterinary Science.
P. J. Glantz.
Applied Microbiology, Vol 26, No 5, p 741-743, November 1973. 3 tab, 9 ref.

Descriptors: *E. coli, Natural streams, *Pollutant identification, *Isolation, *Water pollution sources, Pathogenic bacteria, Enteric bacteria, *Pennsylvania, Coliforms, Cultures, Water pollution, Pollutants, Dominant organisms, Running waters.
Identifiers: *Serotypes, Biochemical tests, Fecal coliforms, Culturing techniques, Crawford Lake, Pine Creek, Marsh Creek, Little Pine Creek, Thompson Run, Cedar Run, Slab Cabin Run, Spring Creek, Paradise Creek.

Of 3,200 cultures of Escherichia coli isolated from streams in Pennsylvania over a 7-year period, 82.46 percent or 2,639 were 0 serogrouped. The largest number of cultures (33.4 percent) belonged to 0 groups 1 to 26, and the second highest number (16.8 percent) belongs to 0 groups 60 to 88. The individual E. coli 0 groups most frequently isolated were ADO3, 18ac, 2a, 3, 7, 73, 139, and OX13. Practically every known standard E. coli 0 group was found in the streams. It was not possible to identify the K and H antigen of every E. coli isolate. Serotypes of E. coli 02a:K1:H6, 026:K60:H11, 055:K59:H27, 086:K62:H2, 112ab:K68:H2, 125ab:K70:H21, 128ab:K67:H2, and 0138:K81:H14 known to be pathogenic for humans and animals were identified. Cultures having the same K antigen but a different H antigen for enteropathogenic E. coli 0 groups 6, 18ab, 18ac, 11ab, 126, 127a, 139, 141, and 147 were also isolated. (Holoman-Battelle)
W74-02988

THE OBSERVATION OF MICRO-ORGANISMS ON SURFACES BY INCIDENT FLUORESCENCE MICROSCOPY,
Aberdeen Univ. (Scotland). School of Agriculture.
A. M. Paton, and S. M. Jones.
Journal of Applied Bacteriology, Vol 36, No 3, p 441-443, September 1973. 2 fig, 2 ref.

Descriptors: *Bacteria, *Yeasts, Sampling, Microscopy, Fluorescence, Food processing industry.
Identifiers: *Sample preparation, *Fluorescent microscopy.

Two methods were developed for viewing surfaces for microorganisms by incident fluorescence microscopy. The direct method involves applying optical brighteners and counterstains directly to samples such as meat, fish, skin, plants and minerals and mounting them on glass slides for microscopic observation. The tape method involves placing adhesive tape on surfaces, such as on food processing equipment, removing the tape, and placing it on a glass slide until processing. Tapes can be treated with a fixative to assist retention of organisms, and counterstained. For viewing, the tapes are treated with optical brighteners and mounted, adhesive side up, on glass slides. The procedures have been used in microbiological studies associated with food manufacture, agricultural research, and dermatological investigations. (Little-Battelle)
W74-02989

AN INTRODUCTION TO THE PHYTOPLANKTON, PRIMARY PRODUCTION AND RELEVANT HYDROGRAPHY OF LOCH ETIVE,
University of Strathclyde, Glasgow (Scotland). Dept. of Applied Microbiology.
For primary bibliographic entry see Field 05C.
W74-02991

STATISTICAL ANALYSIS OF BIOLOGICAL DATA FROM PREOPERATIONAL-POSTOPERATIONAL INDUSTRIAL WATER QUALITY MONITORING,
Tennessee Valley Authority, Chattanooga. Div. of Environmental Research and Development.
A. L. Jensen.
Water Research Vol 7, No 9, p 1331-1347, September 1973. 5 fig, 3 tab, 22 ref.

Descriptors: *Monitoring, *Water pollution effects, *Aquatic populations, *Statistical methods, Data processing, Water quality, Industrial wastes, Seasonal, Sampling, Benthic fauna, Invertebrates.
Identifiers: *Control charts, Data interpretation, Displays.

Trends in data on aquatic populations can be assessed using simple statistical methods and plotting results on control charts. The procedure was developed specifically to monitor the effects of industrial water, e.g. from power plants, on water quality based upon preoperational and postoperational data. Since many conditions cause changes in populations, the control charts are constructed with action limits which specify normal deviations of data. A statistical method is given to eliminate seasonal fluctuations in data. When data fall outside the action limits, a disturbance in the system is suspected. Since sampling of bottom fauna on the basis of transects in statistically unsound, a procedure of stratified sampling was developed for calculating statistical values on the basis of subpopulations. Use of the procedure is demonstrated with data from Browns Ferry Nuclear Power Plant which is being constructed by TVA on Wheeler Reservoir in northern Alabama. It is shown that stream monitoring can detect only relatively large changes that occur in aquatic populations. (Little-Battelle)
W74-02993

FRACTIONATION AND CHARACTERIZATION OF NATURAL ORGANIC MATTER FROM CERTAIN RIVERS AND SOILS BY FREE--FLOW ELECTROPHORESIS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02K.
W74-03062

DETERMINATION OF PHOSPHORUS IN WASTE WATERS FROM THE PULP AND PAPER INDUSTRY,
Institute of Paper Chemistry, Appleton, Wis. Div. of Natural Materials and Systems.
M. A. Buchanan, and D. B. Easty.
Tappi, Vol 56, No 5, p 127-130, May 1973. 1 fig, 4 tab, 4 ref.

Descriptors: Water analysis, *Phosphorus, *Phosphorus compounds, *Phosphates, *Pollutant identification, Analytical techniques, *Pulp wastes, *Lignins, Sulfur compounds, Sulfonates, Chromium, Arsenic compounds, Sulfides, Effluents, Water chemistry, Pulp and paper industry.
Identifiers: Ascorbic acid, Interference (Analytical), Lignosulfonates, Alkali lignins.

The ascorbic acid method for determination of P was modified to adapt it to the analysis of pulp and paper mill effluents. Lignosulfonates in concentrations over 200 mg/liter posed serious interference in total P determinations by producing a typical absorption spectra. Sulfides in amounts above 8 mg/liter reacted immediately with the added combined reagent and thus interfered with the determination of orthophosphates; they were, however, removed by the persulfate digestion and thus did not disturb the total P determination. In the modified procedure devised, Br was added to the samples to remove the sulfide interference and greatly diminish the lignosulfonate interference. Effluents containing alkali lignin produced precipitates that were difficult to filter on neutralization of the persulfate-digested samples. Omission of the neutralization step permitted most of the samples to be filtered readily. Losses of P as aluminum phosphate precipitate were avoided by filtering acidified solutions. In the modified procedure, sulfites up to 1.1 g/liter and sulfates up to 40 g/liter did not interfere. Interferences from hexavalent Cr (1 mg/liter) and As (0.2 mg/liter) were slight, but increased at higher concentrations. (Brown-IPC)
W74-03069

A FLUORIMETRIC DETERMINATION OF LIGNIN SULFONATES FROM NATURAL WATERS IN PRESENCE OF HUMIC SUBSTANCES,
Gotenburg Univ. (Sweden). Dept. of Analytical Chemistry.
T. Almgren, and B. Josefsson.
Svensk Papperstidning, Vol 76, No 1, p 19-23, January 20, 1973. 7 fig, 21 ref.

Descriptors: Water analysis, *Lignins, *Humic acids, *Pollutant identification, *Pulp wastes, *Fluorometry, Analytical techniques, *Spectroscopy, Instrumentation, Rivers, Fjords, Bays, Industrial wastes, Pulp and paper industry, Monitoring, Fluorescence, Water pollution.
Identifiers: Lignosulfonates, Sulfite mills.

Different methods for determining lignosulfonates in the presence of humic compounds are discussed and compared. The UV absorbance of humins generally masks that of lignosulfonates. In analyzing a polluted river water, it was shown, however, that the introduction of lignosulfonates from a sulfite pulp mill effluent can be measured spectofluorimetrically. The sensitivity of the method (0.2 ppm of lignosulfonate) in presence of humins can probably be increased to 20 ppb. The principles of a simple field fluorimeter design are outlined. The suggested method is based on practical measurements of the fluorescence spectra of two different lignosulfonate preparations, Bjorkman lignin, and humic substances in two river waters, as well as fjord or bay waters. Definite differences in peak wavelength and emission intensity per weight per volume were found for the two river waters, while the fluorescence spectra of bay waters were similar and resembled those of humic compounds. (Brown-IPC)
W74-03079

ENHANCEMENT OF SENSITIVITY FOR DETERMINATION OF MERCURY IN WATERS,
Technical Univ. of Budapest (Hungary). Inst. for General and Analytical Chemistry.
E. Harsanyi, L. Polos, and E. Pungor.
Analytica Chimica Acta, Vol 67, No 1, p 229-233, November 1973. 5 fig, 25 ref.

Descriptors: *Mercury, *Water analysis, *Pollu
tant identification, *Analytical techniques, *Trac
elements, Monitoring, Sea water, Spec
trophotometry, Spectroscopy, Toxicity, Chemica
analysis.
Identifiers: Mercury compounds, Methyl mercu
ry, Microanalysis, Atomic absorption spectrosco
py, Concentrating (Enrichment), Tin compounds.

Because of the extreme toxicity of methyl mercu
ry, trace determinations of improved sensitivit
are desirable. Mercury traces are most ap
propriately determined by flameless atomic ab
sorption spectoscopy, but the large sampl
volumes involved recommend the use of a precon
centration step, such as that suggested by Toppin
and Pirie (1972), in which Hg from a 4-liter sea
water sample pretreated with Sn (II) is aerated int
20 ml of a permanganate-sulfuric acid solution
followed by further Sn (II) treatment and aeratio
into the measuring cell. By studying and optimiz
ing the parameters of this method, a rapid sim
plified 16-fold enrichment procedure wa
developed. The modified technique has a detectio
limit of 0.008 ng of Hg/ml, which can be furthe
reduced by decreasing the blank value. Th
transfer efficiency of Hg into the smaller volum
was 93%, and the standard deviation of the en
riching operation was 4% for 7 parallel determina
tions. Several samples can be enriched simultane
ously, independently of the atomic absorptio
measurements, which makes the procedure highl
suited for routine analyses of Hg in waters
(Brown-IPC)
W74-03080

**ANALYSIS OF ORGANIC MATERIALS I
WASTEWATER EFFLUENTS AFTE
CHLORINATION,**
North Texas State Univ., Denton. Dept. o
Chemistry; and North Texas State Univ., Denton
Inst. for Environmental Studies.
W. H. Glaze, J. E. Henderson, IV, J. E. Bell, and
V. A. Wheeler.
Journal of Chromatographic Science, Vol 11, N
11, p 580-584, November 1973. 7 fig, 1 tab, 18 ref.

Descriptors: Water analysis, *Sewage treatmen
*Chlorination, *Chromatography, *Pollutan
identification, *Organic compounds, Chlorine
Analytical techniques, Instrumentation, Wast
water (Pollution), Municipal wastes, Effluents
Resins, *Texas.
Identifiers: Chlorine compounds, Amberlite XAD
2, Column chromatography.

Sewage effluent from the municipal waste trea
ment plant at Denton, Texas, was examined be
fore and after laboratory chlorination. Neutral o
ganic compounds were concentrated by adsorp
tion of Amerlite XAD-2 macroreticular resin, fo
lowed by elution with diethyl ether. The extract
were gas-chromatographed and analyzed by flam
ionization, electron capture, and Coulson ele
trolytic conductivity detectors. New chlorine-con
taining organics were observed by the Coulson de
tector in the chlorinated effluent dosed with as li
tle as 10 mg/liter of available C1. (Brown-IPC)
W74-03081

**ENVIRONMENTAL LEVELS OF RADIOAC
TIVITY AT ATOMIC ENERGY COMMISSIO
INSTALLATIONS.**
Argonne National Lab., Ill.

Radiation Data and Reports, Vol 14, No 5, p 31
330, May 1973. 3 fig, 14 tab, 2 ref.

Descriptors: *Nuclear powerplants, *Energ
*Heat, Water quality standards, Regulation, Leg
aspects, Water policy, Air pollution contro
Radioactive wastes, Water pollution sources, A
mosphere, Fallout, *Radioactivity.

The observed levels of radioactivity at the Atom
Energy Commission installation in Lemont, I

linois are described. The Argonne National Laboratory is a multidisciplinary research and development laboratory with two principal objectives: to carry out a broad program of basic research activities, and to serve as a center for the design and development of nuclear reactors. The Atomic Energy Commission receives from its contractors semiannual reports on the environmental levels of radioactivity in the vicinity of this and other Commission installations. Releases of radioactive materials from AEC installations are governed by specific radiation standards, and where environmental quality standards have been established, the measured concentration or radiation dose is compared with the standard as a means of assessing the hazard. Charts and graphs include those concerning penetrating radiation, radioactivity in milk, plutonium in soil and grass, radioactivity in surface water, radioactivity in the air, and gamma-ray radioactivity in air-filter samples. (Mockler-Florida)
W74-03136

STORAGE AND RETRIEVAL OF WATER QUALITY DATA--TRAINING MANUAL.
Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.

Available from NTIS, Springfield, Va 22151 as PB-214 580. Price $6.00 printed copy; $1.45 microfiche. Environmental Protection Agency Water Quality Office Training Manual, April 1971. 302 p.

Descriptors: *Data storage and retrieval, *Water quality, *Data processing, *Computer programs, Documentation, Data collections, Data transmission, Information retrieval, Training, Schools (Education).
Identifiers: Training manuals.

STORET is the data storage and retrieval system developed by and for the Environmental Protection Agency (EPA) and is a system suitable to the needs of all users of water quality and water resource data. Information and instruction on the STORET system is provided for those persons directly involved in accumulating, processing, and utilizing water data. However, the manual was prepared primarily for reference use of students enrolled in scheduled training courses of the Water Quality Office, Environmental Protection Agency. The seven chapters include: (1) the STORET system; (2) defining station locations; (3) typical problem; (4) station location storage; (5) data storage; (6) changing and deleting station and water quality data; and (7) retrieval. The appendices include: (A) State-County codes, and (B) parameter codes. (Woodard-USGS)
W74-03171

INCIDENCE OF VIBRIO PARAHAEMOLYTICUS IN SHELLFISH FROM EIGHT CANADIAN ATLANTIC SAMPLING AREAS,
Department of National Health and Welfare, Ottawa (Ontario). Health Protection Branch.
W. K. Thomson, and C. L. Thacker.
J Fish Res Board Can, Vol 29, No 1, p 1633-1635, 1972, Illus.
Identifiers: *Atlantic Ocean, Canada, Clams, Human diseases, Incidence, Japan, Mussels, Oysters, Sampling, *Shellfish, *Vibrio-parahaemolyticus.

During July-Oct., 78 cultures of V. parahaemolyticus, closely resembling strains isolated from human cases in Japan, were isolated from clams, mussels, and oysters collected from 8 Canadian Atlantic areas. Approximately 22% of the shellfish examined yielded this species, about half being detectable by direct plating and the rest after enrichment before plating.--Copyright 1973, Biological Abstracts, Inc.
W74-03185

5B. Sources of Pollution

THE IDENTIFICATION AND MEASUREMENT OF CHLORINATED HYDROCARBON PESTICIDES ACCUMULATED FROM URBAN RUNOFF,
Tulsa City--County Health Dept., Okla.
For primary bibliographic entry see Field 05A.
W74-02665

MODELING AND MANAGEMENT OF WATER AND RELATED LAND RESOURCES FOR PHOSPHORUS CONTROL AND ECOLIBRIUM,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Systems Engineering.
Y. Y. Haimes, P. Das, K. Sung, and K. S. Lee.
Available from the National Technical Information Service as PB-226 419, $6.75 in paper copy, $1.45 in microfiche. Progress report, June 1973. 85 p, 7 fig, 2 tab, 35 ref, 3 append. OWRR B-045-OHIO (1).

Descriptors: *Water quality control, *Mathematical models, *Simulation analysis, *Input-output analysis, *Cost-benefit analysis, Phosphorus, Optimization, Land resources, Legal aspects, Overflow, Waste water treatment, Runoff, Streamflow, Hydrology, Equations, Systems analysis, Lake Erie.
Identifiers: *Ecolibrium.

This progress report summarizes present research results and planned future studies and discusses the total water and land resources system model of the Water Resources Group within the Rockefeller Project for Phosphorus Pollution Control. The scope of this work has been dominated by two major themes (1) distributed pollution sources (carried to the waterbody primarily by runoffs) will play a critical role in the ultimate solution of the water pollution problem; and (2) the level of pollution discharged to a waterbody, attributed both to point and distributed sources, depends on the economic activity of the region as well as on its hydrologic characteristics. Two principal submodels of the total system model are used for modeling the two major themes. First, 'The Modified Stanford Streamflow Simulation Model' predicts the response of the watershed to an input of precipitation on it. Second, 'The Modified Leontief Input-Output Model' predicts the pollutant levels of each sector of the economy in the region as a linear function of the production level of that sector. Economic analysis is performed utilizing various other submodels: capacity expansion 'cost' model; distributed source 'cost' model; ecosystem response 'benefit' model; and a management and coordination (cost-benefit analysis) model. (Bell-Cornell)
W74-02675

OPTIMAL CONTROL OF NITROGEN LOSSES FROM LAND DISPOSAL AREAS,
Cornell Univ., Itaca, N.Y.
D. A. Haith.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 99, No EE6, Proceedings paper No 10200, 923-937, December 1973. 4 fig, 6 tab, 28 ref.

Descriptors: Water pollution control, Management, *Nitrogen compounds, *Waste disposal, *Sludge, *Linear programming, *Mathematical models, Environmental engineering, Equations, Systems analysis, *New York, Constraints.
Identifiers: *Leaching losses, Soil nitrogen, Disposal schedules.

Concern for environmental quality is forcing a reconsideration of waste disposal alternatives. The land disposal alternative is not free from water pollution potential. Nitrogen losses from percolation and runoff may contaminate water supplies and contribute to the eutrophication of aquatic systems. A general model of the soil nitrogen budget was developed for the purpose of comparing alternative strategies for controlling nitrogen leaching losses from a cropped land disposal area. The model is based on monthly inventory equations for both inorganic and organic soil nitrogen uptake, mineralization of organic nitrogen, and leaching. The model was tested using nitrogen budget data from several New York corn production field studies. The model was linearized and linear programming was used to find monthly disposal schedules that maximize annual returns from a sewage sludge disposal system subject to constraints on nitrogen leaching losses. (Bell-Cornell)
W74-02677

MULTIGOAL WATER QUALITY PLANNING MODEL,
Krannert Graduate School of Industrial Administration, Lafayette, Ind.
D. E. Pingry, and A. B. Whinston.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 99, No EE6, Proceedings paper No 10208, p 909-922, December 1973. 1 fig, 15 ref.

Descriptors: Environmental engineering, Water pollution control, *Alternative planning, *Comprehensive planning, *River basins, Economics, Temperature, *Dissolved oxygen, Regional analysis, Treatment facilities, Methodology, Systems analysis, Mathematical models.
Identifiers: *Multiobjective planning, *Nonlinear programming, Streeter-Phelps model, *Cost minimization.

In view of the large variation in stream assimilative capacity, uniform pollution control rules introduce significant inefficiencies. A methodology is presented which takes advantage of these variances and treats water pollution as a regional, basin-wide problem. A simulation model of river basin water quality serves as the constraint set for an optimization model that searches for the least-cost solutions given the quality goals. Specifically, the traditional Streeter-Phelps dissolved oxygen model is integrated with a heat decay model. The resulting quality model is incorporated into a nonlinear programming river basin model that solves for the minimum cost combination of treatment strategies to meet predetermined quality goals. This modeling technique is unique in two respects: (1) the interaction of temperature and dissolved oxygen levels is explicitly modeled; and (2) five alternative treatment strategies are examined. The behavior of both thermal and oxygen demanding wastes in a river is always modeled independently, even though it is well known that the level of the temperature affects the rates of oxidation reactions and the saturation level of oxygen; herein however these relations are explicitly assumed. The treatment strategies examined simultaneously are on-site treatment, regional treatment, by-pass piping, flow augmentation, and cooling towers. (Bell-Cornell)
W74-02678

A WATER QUALITY SIMULATION MODEL,
Meta Systems, Inc., Cambridge, Mass.
E. McBean, O. T. Sigvaldason, R. deLucia, M. Fiering, and I. K. Hill.
In: Proceedings of the Summer Computer Simulation Conference, Montreal, P.Q., Canada, July 17-19, 1973. 11 p, 7 fig, 2 tab, 5 equ, 25 ref.

Descriptors: *Water quality, *Management, *Planning, *Simulation analysis, Hydrology, *Stochastic processes, Evaluation, Environmental control, Environmental effects, Watersheds (Basins), Dissolved oxygen, Water quantity, Mathematical models, Systems analysis, *Canada.
Identifiers: Methodological study, *Saint John River (Canada), Environmental quality, Ecological damage.

A generalized water quality simulation model developed as part of a methodological study of water quality management planning (to be used therein in conjunction with a prescriptive, screening model) is described. The model allows considerable latitude of application and is particularly useful for problems of large basins and long periods of potentially critical quality conditions. The model demonstrates significant contributions in the tandum use of mathematical models to understand stressed regions where intensity, frequency, and duration of water quality stress are important measures of ecological damage. Also, the model provides insight into conditions where the quality levels are unstable (in time or space)--which implies potential shifts in multiple critical reaches. To avoid excessive computer storage requirements, the model has been divided into five segments: (1) synthetic seasonal flow generator; (2) daily hydrology inflow generator; (3) flow routing segment; (4) quality routing segment; and (5) output segment. A case study application to the Saint John River is describe. (Bell-Cornell)
W74-02683

LOWER FUNGI AS TEST ORGANISMS OF POLLUTANTS IN SEA AND BRACKISH WATER: THE EFFECTS OF HEAVY METAL COMPOUNDS AND PHENOL ON THRAUSTOCHYTRIUM STRIATUM (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 05C.
W74-02696

THE ADSORPTION OF RHODAMINE-B ON TO MATERIALS CARRIED IN SUSPENSION BY INSHORE WATERS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab.
J. W. Talbot, and J. L. Henry.
Journal du Conseil, Vol 32, No 1, p 7-16, July 1968. 4 fig, 1 tab, 4 ref.

Descriptors: Coasts, *Estuaries, *Rhodamine, *Dye concentrations, *Path of pollutants, Circulation, *Adsorption, *Suspended load.

Experiments have been carried out to investigate the adsorption of Rhodamine-B on to suspended material when the dye is used in the turbid waters of some English east coast estuaries. This adsorption appears to be most serious when large dilution has taken place. The experimental results lead to an equation between observed dye concentrations and that to be expected under otherwise similar conditions but without loss of dye from solution by adsorption. It appears that significantly improved results are obtained when adsorption is taken into account, although it is clear that the assumption of a constant value of the suspended load must be an approximation which will limit the accuracy attainable. (Sinha - OEIS)
W74-02721

PROBLEMS OF UNDERGROUND STORAGE OF WASTES,
Geological Survey, Raleigh, N.C.
R. L. Nace.
Journal of Research of the U S Geological Survey, Vol 1, No 6, p 719-723, November-December 1973. 8 ref.

Descriptors: *Underground waste disposal, *Waste disposal wells, *Water pollution sources, Water pollution effects, Path of pollutants, Groundwater, *Waste storage, *Underground storage.

Problems of underground storage of waste involve geology in its broadest sense, including hydrology, geochemistry, and geophysics. Wastes may be solid, liquid, or gaseous, and they may be chemically toxic or noxious, esthetically offensive, or radioactive. Some wastes require only temporary containment, whereas others must be isolated for indefinitely long periods. The means and locale for emplacement underground depend upon many governing geological factors, including the physical, chemical, hydrological, and hydraulic properties of the host formation. These must be studied relative to the physical, chemical, and thermal properties of the waste and of potential interactions between the waste and the host formation. Thorough knowledge is essential because lack of it may lead to undesirable or disastrous environmental consequences. Escape of waste may contaminate the surface or near-surface environment; it may destroy the usefulness or accessibility of resources such as groundwater, petroleum, and minerals. Effective management of underground waste requires adaptation of current technology and development of new technology. (Knapp-USGS)
W74-02732

EFFECTS OF MIGRATORY WATERFOWL ON WATER QUALITY AT THE MONTEZUMA NATIONAL WILDLIFE REFUGE, SENECA COUNTY, NEW YORK,
Geological Survey, Albany, N.Y.
M. R. Have.
Journal of Research of the U S Geological Survey, Vol 1, No 6, p 725-734, November-December 1973. 2 fig, 5 tab, 15 ref.

Descriptors: *Water quality, *Wildlife management, *Waterfowl, *Shellfish, Commercial fishing, Water pollution sources, Path of pollutants, Bacteria, Nutrients, Pathogenic bacteria, Aquatic bacteria, *New York.

To find whether bacteria in effluent from the national wildlife refuges along the northeast coast of the United States may be adversely affecting the harvest of shellfish, water quality was studied in the Montezuma Refuge, N. Y. A line graph shows inconsistent relationships between bird population at the Montezuma refuge and total coliform, fecal coliform, and fecal Streptococci counts. Salmonella were found in only one of 17 samples of water taken within the refuge. Counts of nonpathogenic bacteria in the two major streams flowing into the refuge, Black Brook and White Brook, were greater than they were in water flowing out of the refuge. Specific conductance of water flowing out of the refuge was less than that of water flowing into the refuge, although the effluent had higher concentrations of phosphorus and nitrogen than the influent. A settling-pond effect in the quiet water of the refuge may help explain the improvement in the quality of the water leaving the refuge. (Knapp-USGS)
W74-02733

DISPOSAL OF BRINE INTO AN ESTUARY,
Camp, Dresser and McKee, Inc., Pasadena, Calif.
A. B. Pincince, and E. J. List.
Journal Water Pollution Control Federation, Vol 45, No 11, p 2335-2344, November 1973. 9 fig, 2 tab, 8 ref.

Descriptors: *Brines, *Jets, *Path of pollutants, *Estuaries, Mixing, Dispersion, Density, Density currents, Turbulence, Model studies, Hydraulic models.

Because of their toxicity, brines must often be diluted when discharged to fresh of saline water using multiple-port diffusers. These negatively buoyant jets behave quite differently from wastewater jets, which are lighter than the seawater to which they are often discharged. A theoretical and laboratory study was made of brine dilution after discharge from an outfall into a flowing stream. Initial analysis was based on studies conducted on disposal of brine into still water; a laboratory study was conducted to obtain concentration profiles for various current velocities and angles of the discharge port. Comparison of experimental results with a jet theory relying on entrainment and drag shows that the theory predicts much lower dilutions. The apparent reason for the inadequacy of the theory is that it ignores ambient turbulence. (Knapp-USGS)
W74-02735

A GALERKIN-FINITE ELEMENT SIMULATION OF GROUNDWATER CONTAMINATION OF LONG ISLAND, NEW YORK,
Princeton Univ., N.J. Dept. of Civil and Geological Engineering.
G. F. Pinder.
Water Resources Research, Vol 9, No 6, p 1657-1669, December 1973. 7 fig, 18 ref.

Descriptors: *Path of pollutants, *Groundwater movement, Malenclaves, Finite element analysis, Transmissivity, Mass transfer.
Identifiers: Galerkin method, Long Island (NY).

The Galerkin method of approximation in conjunction with the finite element method of analysis may be used to simulate the movement of groundwater contaminants. In solving the groundwater flow and mass transport equations this approach allows a functional representation of the dispersion tensor, transmissivity tensor, and fluid velocity, as well as an accurate representation of boundaries of irregular geometry. A field application of the method to chromium contamination on Long Island, New York, shows that accurate simulations can be obtained by using the Galerkin-finite element approach. (Knapp-USGS)
W74-02772

ANALYSIS, MODELING AND FORECASTING OF STOCHASTIC WATER QUALITY SYSTEMS, VOLUME I, TIME SERIES ANALYSIS IN WATER QUALITY MODELING,
Kansas Water Resources Research Inst., Manhattan.
E. S. Lee.
Available from the National Technical Information Service as PB-226 566 $6.50 in paper copy, $1.45 in microfiche. Completion Report, Contribution No. 110, July 1972. 272 p, 43 ref. OWRR A-048-KAN (1).

Descriptors: *Water quality, System analysis, *Forecasting, *Model studies, *Time series analysis, Mathematical models, Simulation analysis, Groundwater, Water resources management, Hydrologic models, Pollution, Water temperature, Potomac River, Regression analysis, Activated sludge, Path of pollutants.
Identifiers: *Nonlinear filtering, Spectral analysis, Ontario River.

Optimal and nonlinear filtering, and time series analysis and estimation are used for the modeling and forecasting of water quality systems. The principal advantage of the time series approach is that useful quantitative information can be abstracted from the original rough data which are collected over a long period of time. Furthermore, by the analysis of these rough data, useful mathematical representations of the various pollution parameters can be obtained. Actual data obtained from Potomac River and Ontario River are used to illustrate the technique. The principal advantage of the nonlinear filtering approach is the sequential nature of the estimation scheme. Various linear and nonlinear estimation schemes such as Kalman filters, minimum variance estimator, maximum likelihood (Bayessian) estimator, maximum a posteriori estimator, and the dynamic programming estimator are investigated and compared. To increase the convergence rate, optimization and purterbation are incorporated into the various nonlinear estimation schemes. The computational results indicate that both the time series analysis and nonlinear filtering are useful techniques for the modeling and forecasting of water quality systems. (See also W74-02824)

W74-02823

ANALYSIS, MODELING AND FORECASTING OF STOCHASTIC WATER QUALITY SYSTEMS, VOLUME II, NONLINEAR FILTRATION AND ESTIMATION IN WATER QUALITY MODELING,
Kansas Water Resources Research Inst., Manhattan.
E. S. Lee.
Available from the National Technical Information Service as PB-226 567 $5.75 in paper copy, $1.45 in microfiche. Completion Report, Contribution No. 110, July 1972. 224 p, 286 ref. OWRR A-048-KAN (1).

Descriptors: *Water quality, System analysis, *Forecasting, *Model studies, *Time series analysis Mathematical models, Simulation analysis, Groundwater, Water resources management, Hydrologic models, Pollution, Water temperature, Potomac River, Regression analysis, Activated sludge, Path of pollutants.
Identifiers: *Nonlinear filtering, Spectral analysis, Ontario River.

Optimal filtering and estimation is used for water quality modeling and prediction; nonlinear estimation and filtering techniques are emphasized. According the degree of approximations, there are first-order and second-order nonlinear filters. These various filters are applied to a typical water quality problem. The advantage of the filtering approach is that a sequential estimation scheme is obtained. Only current data are needed to estimate the current or future values of the parameters. Not only the parameters but also the future concentrations of the pollutants can be estimated by this approach. Thus, it forms an effective forecasting technique which used the weighted average of the past and current experimental data. One of the problems in applying the invarient imbedding and nonlinear filtering schemes is that the convergence rate depends on the initial value used of the adjoint or weighting function equations. Two approaches are developed to obtain the optimal or best initial values of the weighting function: optimization approach and purterbation. The latter approach appears to be more effective. The effect of the initial conditions of the weighting function on the convergence rate of BOD is also discussed. (See also W74-02823)
W74-02824

AN OVERVIEW OF MARYLAND'S SEDIMENT CONTROL PROGRAM,
Maryland Dept. of Natural Resources, Annapolis. Water Resources Administration.
For primary bibliographic entry see Field 05G.
W74-02852

4 WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-02856

CALEFACTION OF THE CONNECTICUT RIVER, U.S.A.,
Yale Univ., New Haven, Conn. Dept. of Biology.
D. Merriman.
Transactions of the New York Academy of Sciences, Vol 35, No 1, p 59-65, January 1973. 26 ref.

Descriptors: *Nuclear power plants, *Heated water, Rivers, *Connecticut River, Electric power production, *Thermal pollution, Cooling water, Effluents, Aquatic environments, Environmental effects, Aquatic animals, Benthos, On-site-data collections, Evaluation, Migration, Growth, Mortality, Salinity, Temperature, Shad.

In 1966 an atomic power plant went into operation in the Haddam Neck region of the Connecticut River. A long-term study of the environmental impact of the facility which began in 1965 is discussed. The Haddam Neck region is about 15.5 miles from the mouth of the river. In this area the river is tidal in character, rising and falling 2.5 feet and having a salinity of from 25 to 31 parts per thousand. The average daily natural flow of the river is about 16,000 cu ft/s. The condenser cooling effluent is returned to the river in a flow of 828 cu ft/sec. with a temperature increase of 22.4 degrees F. The resulting heated plume streams upriver on the flood-tide as far as two miles and extends completely across the river during ebb. Benthic fauna in the intake and discharge areas were affected by turbulence and temperature changes. Catfish and bullhead fish species were observed to collect in large numbers in the discharge canal of the power plant during the winter months. Major fish kills have been recorded on three occasions since the plant went into operation. In a specific study of shad, no alterations of population size, migration rates or age and spawning history attributable to thermal effluents have been observed. (Jerome-Vanderbilt)
W74-02864

CHARACTERISTICS OF STEAM ELECTRIC CONDENSER COOLING WATERS,
Johns Hopkins Univ., Baltimore, Md.
W. L. Graves, Jr., and J. E. Edinger.
In: Proceedings of the Industrial Waste Conference, University of Delaware, Newark, Nov 13-15, 1967. p 255-274 (1967), 11 fig.

Descriptors: *Heated water, *Effluents, *Temperature, Distribution, On-site data, *Estuarine, Electric power production, Thermal power plants, Discharge (Water), Collections, Analytical techniques, Models, Forecasting, *Tidal waters, Meteorology, Design, Water temperature, Frequency analysis, Time series analysis, *Thermal pollution.

A survey program to obtain data to test the temperature distributions of receiving waters under varying meteorological conditions, for the purpose of predicting water temperatures near thermal discharges is discussed. The rate of heat exchange at the water surface and the factors important to the heat budget are considered. The field study program was divided into four groups: meteorological; plant information; hydrographic observations; and observations using portable equipment to check recording instruments. Meteorological measurements included air temperature, relative humidity, wind speed, wind direction, solar radiation and precipitation. Plant information included total plant load, total heat rejected, condensing cooling water intake and discharge temperatures, and the pumping rate of cooling water. A 150 megawatt power plant site located only 6 miles from the Atlantic Ocean was chosen as an example. Time series data are analysed by means of time domain to frequency domain transformations. The results are presented in the form of periodogram estimates of the spectra. (Jerome - Vanderbilt)
W74-02869

THE REALITIES OF THERMAL POLLUTION - ENVIRONMENTAL LIMITATIONS AND ECOLOGICAL ADAPTATIONS,
La Salle Coll., Philadelphia, Pa.
For primary bibliographic entry see Field 05C.
W74-02870

MHD CENTRAL POWER: A STATUS REPORT,
Tennessee Univ., Space Inst., Tullahoma.
J. B. Dicks.
Mechanical Engineering, Vol 94, No 5, p 14-20, May 1972, 8 fig, 2 tab, 18 ref.

Descriptors: *Electric power production, *Thermal powerplants, Nuclear energy, Fossil fuels, Chemical reactions, Thermal pollution, Cost analysis, Breeder reactors, Electric power demand, Design, Research and Development.
Identifiers: *Magnetohydrodynamics, *Thermal efficiency, MHD power plants, Energy crisis.

Magneto-hydrodynamic power (MHD) is generated when an easily ionized metal, such as potassium or cesium, is introduced into a high-temperature combustion gas, which is expanded and directed into a magnetic field. A moving conductor cuts magnetic field lines and a useful emf is generated. This process may soon become an important source of electric power. Until recently the problems associated with high temperatures have prevented application of this technique to combustion gas plasmas. Within approximately ten years it should be possible to construct practical MHD power plants in the 2000-MW range with thermal efficiencies of up to 50 to 60%. The cost of MHD power is compared with existing and proposed electric power sources. Present research and development efforts in the U.S. and other nations are considered. Although there is research continuing at Stanford University and the University of Tennessee, no central-power MHD programs have as yet begun. The higher efficiency and resultant economy would recommended increased research and development of technology in this area in the United States, as this country is falling further behind such countries as Japan and the Soviet Union, where full scale experiments are already being conducted. (Jerome-Vanderbilt)
W74-02871

THE COOLING WATER OF POWER STATIONS: A NEW FACTOR IN THE ENVIRONMENT OF MARINE AND FRESH-WATER INVERTEBRATES,
Central Electricity Generating Board, Southampton (England). Marine Biological Lab.
For primary bibliographic entry see Field 05C.
W74-02879

POWER PLANT EFFLUENT - THERMAL POLLUTION OR ENERGY AT A BARGAIN PRICE,
Westinghouse Research Lab., Pittsburgh, Pa.
W. S. Lusby, and E. V. Somers.
Mechanical Engineering, Vol 94, No 6, p 12-15, June, 1972, 4 fig, 1 tab, 6 ref.

Descriptors: *Electric power production, *Thermal pollution, *Heating, *Air conditioning, Thermal power plants, Design, Cooling, Cost analysis, Economics, Fossil fuels, Seasonal, Geothermal studies, Model studies.
Identifiers: *Model towns, Reykjavik, Lithium-Bromide refrigeration.

It is possible that waste heat from electric power plants may become an economical source of energy. One proposal for using this heat effectively in both winter and summer seasons is the development of integrated heating and cooling systems for 'new towns'. A heating system using geothermal winter services about 81,000 people in Reykjavik at a cost which is only 60% of that for fossil fuels. A heat driven lithium-bromide refrigeration system could supply chilled water for cooling interior space. Since there is a good match between the peak power demand for home heating in winter and home cooling in the summer, an integrated system using the waste thermal energy from electricity generation as a power source is possible. An integrated design for a new community using such a system is outlined. A cost analysis of combined electrical and heating/cooling systems is presented. (Jerome-Vanderbilt)
W74-02888

SOME ASPECTS OF CHEMICAL CONTROL OF SOIL-BORNE PATHOGENS,
Plantenziektenkunde Dienst, Wageningen (Netherlands).
A. F. H. Besemer.
Bull Oepp (Organ Eur Mediterr Prot Plant). 7. p 31-40. 1972.
Identifiers: *Bacteria, *Chemical control, Chloropicrin, Metabolites, *Pathogens (Soil-borne), Propene, Nitrification, Soil fumigants.

The effect of a soil fumigant on soil-borne pests and pathogens depends largely on a sufficient distirbution through the top soil and the availability of the fumigant or the biologically active degradation products in the water phase. Nearly all the fumigants are dispersed in the soil mainly in the vapor phase and therefore the amount of air between the soil particles is very important. Consequently on light soils it is relatively easy to obtain an efficient control, but on heavy or wet soils and on soil types with a high humus content it is rather difficult to get reliable results. The concentration of the fumigant in the upper few centimeters of the soil is often insufficient to get good control after injection of the material at 15-20 cm depth. The effect may be improved by using a plastic cover or a 'split plot' application. The elimination of most of the fumigant is necessary to avoid a phytotoxic effect on wet soils and on soil types with a high organic content. Factors influencing the decrease of the fumigant residue in the soil are discussed. The soil fumigant application gives rise to important changes in the whole ecosystem in the soil. Information on the influence on non-target organisms is scarce. The application of dichloropropene and of chloropicrin may lead to a noticeable effect on the nitrificating bacteria. The soil application of fumigants may give rise to residues in plants of the parent chemical or, to a larger extent, to residues of metabolites. The fate of the metabolites arising from dichloropropene and related compounds has not been fully clarified.--Copyright 1973, Biological Abstracts, Inc.
W74-02889

ENVIRONMENTAL CHALLENGES AND NUCLEAR FUELS,
Bechtel Power Corp., San Francisco, Calif.
W. K. Davis.
Chemical Engineering Progress, Vol 69, No 6, p 48-53, June 1973. 2 fig.

Descriptors: *Nuclear power plants, *Thermal pollution, *Fuels, *Forecasting, Research, Electric power production, Environment, Fossil fuels, Radioactivity, Design criteria, Safety factors, Radioactive wastes, Nuclear reactors, Breeder reactors, Uranium, Development, Economics, Efficiencies, Radioisotopes.

The increasing demand for energy makes it likely that nuclear power plants will remain a major source of electricity. A discussion of the environmental and technological problems associated with nuclear energy is separated into short-range, mid-term, and long range situations. The short-term period is considered to be the next 8 to 10 years and the associated problems are mainly of a social and political nature. The mid-term covers from the early 1980's until the year 2000, and the major problems for consideration are selection of priorities and areas of new developments. The long-term period extends beyond 2000 during which new inventions and their application must be considered. Nuclear energy is expected to fill 16% of the national energy requirement in 1985. Heat rejection is the largest problem associated with reactor operation. The use of breeder reactors could provide a greatly increased supply of nuclear fuel. Improved reactor design and cooling technology should reduce thermal pollution to some extent but it seems clear that compromises must be made somewhere. Radio-activity leaks from power plants are not considered a serious problem, and radio-active wastes are very small in quantity. Nuclear energy still provides the most hopeful source of fuel to fill long range energy requirements. (Jerome-Vanderbilt)
W74-02892

A MICROBENTHOS STUDY OF ROTATORIA,
Lund Univ. (Sweden). Limnological Inst.
For primary bibliographic entry see Field 02H.
W74-02893

EFFECT ON ORGANISMS OF ENTRAINMENT IN COOLING WATER: STEPS TOWARD PREDICTABILITY,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05C.
W74-02894

EFFECTS OF THERMAL ADDITIONS FROM THE YELLOWSTONE GEYSER BASINS ON THE BACTERIOLOGY OF THE FIREHOLE RIVER,
Indiana Univ., Indianapolis. Dept. of Microbiology.
J. G. Zeikus, and T. D. Brock.
Ecology, Vol 53, No 2. p 283-290 Early Spring 1972. 5 fig, 2 tab, 12 ref.

Descriptors: *Thermal springs, *Temperature, *Geothermal studies, *Thermal pollution, Bioassays, Rivers, Heated water, Benthos, Bacteria, Aquatic habitats, Thermophilic bacteria, Geysers.
Identifiers: *Firehole River, Yellowstone Geyser Basins, Bacteriology.

A series of stations was established on the Firehole River where it flows through the main geyser of Yellowstone Park, and temperature, pH, alkalinity, conductivity, and phosphate were measured. The temperature of the water gradually increased as it flowed through the thermal area, at its warmest averaging about 16C higher than in the cool area (10 to 26C). Thermophilik organisms were not present in water which had not received thermal additions, but both kinds of thermophiles were found in the warm water, and numbers increased progressively as more thermal water entered. In the recovery zone downstream from the thermally heated region, the number of thermophilic bacteria decreased markedly. The possible value of these thermophilic bacteria as indicators of thermal pollution is discussed. It is suggested that the Firehole River is an excellent model for long-term studies on the ecological consequences of thermal pollution. (Jerome-Vanderbilt)
W74-02895

FREE CONVECTION FILM CONDENSATION OF STEAM IN THE PRESENCE OF NON-CONDENSING GASES,
Queen Mary Coll., London (England). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 08B.
W74-02896

CALCULATION OF HEAT TRANSFER IN TURBULENT FLOW WITH ALLOWANCE FOR SECONDARY FLOW,
Gosudarstvennyi Komitet po Ispolzovaniyu Atomnoi Energii SSSR, Obninsk. Fiziko-Energeticheskii Institut.
For primary bibliographic entry see Field 08B.
W74-02904

CHESAPEAKE BAY MODEL STUDY FOR CALVERT CLIFFS,
Worcester Polytechnic Inst., Mass. Alden Research Labs.
L. C. Neale.
Journal of the Power Division, American Society of Civil Engineers, Vol 97, No P04, p 827-838, December, 1971. 12 fig.

Descriptors: *Model studies, *Thermal pollution, *Chesapeake Bay, Temperature, *Thermal powerplants, Distribution patterns, Powerplants, Fish, Water pollution, Water quality, Jets.
Identifiers: *Jet entrainment.

The model studies of a 34-mile section of Chesapeake Bay have developed the flow patterns of the warm water effluent from the Calvert Cliffs Nuclear Power Station. These flow patterns, shown as plots of the plan view model area and cross sections at several points, describe in three dimensions the magnitude and location of excess temperature. It was demonstrated that the release of the warm water as a 10F jet well off shore (850 ft) induced entrainment of available receiving water so that maximum temperatures at the water surface outside a small local area reached only 4F. The shape and sweep of the warm water plume allowed a large percentage of the cross section of the bay to operate as a clear passage (no temperature) for fish. (Oleszkiewicz-Vanderbilt)
W74-02905

ON ENVIRONMENTAL FACTORS OF EEL PONDS: CHEMISTRY OF WATER AND SOIL AND PLANKTON IN MARCH AND JUNE 1967, (IN JAPANESE),
Freshwater Fisheries Research Lab., Tokyo (Japan).
For primary bibliographic entry see Field 02H.
W74-02933

ON THE WATER QUALITY OF LAKE BIWA, THE SETA RIVER AND SOME RIVERS IN OTSU CITY AND THE HEAVY METAL CONTENT OF BOTTOM MATTERS OF LAKE BIWA, (IN JAPANESE),
Shiga Univ., Otsu (Japan). Faculty of Education.
O. Itasaka, Y. Okumura, T. Hori, K. Hashimoto, and Y. Ohyama.
Mem Fac Edu Shig Univ Nat Sci. 21. p 12-23. 1971. Illus. (English summary).
Identifiers: *Bottom sediments, Corbicula-Sendai, *Heavy metals, *Japan (Lake Biwa), Lakes, Pollution, Rivers, Water quality, Mercury, Cadmium, Lead, Nitrogen, Calcium.

The transparency of the water of the northern part of Lake Biwa, Japan has fallen to 3/5 and the total N (>0.2 ppm) has risen, which means that the upper water of the northern part of the lake is heavily polluted. The heavy metal (Hg, Cd and Pb) content of the bottom matters of Lake Biwa indicates that the bottoms of Hama-otsu and Nionohama are polluted by heavy metals. The accumulation of Ca in the freshwater bivalve, Corbicula sandai, increases 1 ppm/year with the age of the shellfish.--Copyright 1973, Biological Abstracts, Inc.
W74-02935

PROCESSES, PROCEDURES, AND METHODS TO CONTROL POLLUTION RESULTING FROM SILVICULTURAL ACTIVITIES.
Environmental Protection Agency, Washington, D.C. Office of Air and Water Programs.
For primary bibliographic entry see Field 05G.
W74-02946

PETROLEUM SYSTEMS RELIABILITY ANALYSIS, VOLUME I - ENGINEERING REPORT, A PROGRAM FOR PREVENTION OF OIL SPILLS USING AN ENGINEERING APPROACH TO A STUDY OF OFFSHORE AND ONSHORE CRUDE OIL PETROLEUM SYSTEMS,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
For primary bibliographic entry see Field 05G.
W74-02947

THE MOVEMENT AND IMPACT OF PESTICIDES USED FOR VECTOR CONTROL ON

THE AQUATIC ENVIRONMENT IN THE NORTHEASTERN UNITED STATES,
Little (Arthur D.), Inc., Cambridge, Mass.
C. D. Reese, and D. L. Becker.
Copy available from GPO Sup Doc, $1.75; microfiche from NTIS as PB-217 843, $1.45. Report No. EPA-OWP-TS-00-72-09, July 1972. 202 p, 15 tab, 263 ref. Contract No. DI-68-01-0129.

Descriptors: *Pesticide toxicity, *Pesticide residues, Legislation, *Biodegradation, *Reviews, Water pollution effects, Path of pollutants, Public health, Animal metabolism, Pest control, DDT, Dieldrin, Fish, Invertebrates, Worms, Shellfish, *Northeast U.S.
Identifiers: *Fate of pollutants, *Cape Cod, Biotransformation, Malathion, Methoxychlor, Abate, Naled, Carbaryl, Carbofuran, Fenthion, Fuel oil, Pyrethrum, Paris green, Persistence, Macroinvertebrates.

Because of the importance of Cape Cod as a fishing and recreational area and its long history of mosquito abatement programs, a case study was conducted to investigate the kinds and quantities of vectoricides used, methods of application, routes into water, degradation and metabolism, effects on ecosystems, and laws and regulations affecting their use. The Bass Hole Marsh in Dennis and the Herring River Marsh in Harwich were selected for intensive study to compare the effects of treatment programs on the north and south shores of Cape Cod. A literature search was conducted, interviews were held, and field work was undertaken in the two marshes to observe the effects of vectoricides on the aquatic environment and to determine the levels of vectoricide residues in soil and water samples. (Little-Battelle)
W74-02948

ON THE SYSTEMATICS AND ECOLOGY OF THE GENUS CHAMESIPHON (CYANOPHYCEAE). 2. ECOLOGY (ZUR SYSTEMATIK UND OKOLOGIE DET GATTUNG CHAMESIPHON (CYANOPHYCEAE) 2. OKOLOGIE),
Biological Station, Lunz am See (Austria).
For primary bibliographic entry see Field 05C.
W74-02952

LAKE MICHIGAN DISCHARGE STUDIES.
Illinois Inst. for Environmental Quality, Chicago.

Available from National Technical Information Service as PB-221 869, $9.50 in paper copy, $1.45 in microfiche. Final Report, June 1973. 146 p, 6 fig, 30 tab, append.

Descriptors: *Industrial wastes, Electric power industry, Food processing industry, *Domestic wastes, *Electric powerplant, *Chemical wastes, Boiler feed water, Biochemical oxygen demand, Cooling water, Waste water (Pollution), Dissolved solids, Thermal pollution, Recycling, Hydrogen ion concentration, Alkalinity, Hardness (Water), Phosphorus, Ammonia, Sodium, Calcium, Magnesium, Sulfates, Chlorides, Iron, Copper.
Identifiers: *Pharamaceutical plants, Flour mills, Cereal plants, *Steel millsm *Piping companies, *Smelters, Characterization, Outboard motors, Fermentation beers, Process wastes, Organic carbon, Blowdown, Slag tanks, Demineralizers, Filter backwash, Grain elevators, Settleable solids, Organic nitrogen, Plating wastes, Pickle liquors, Ballast water, Hexane solubles.

To investigate the feasibility of zero discharge of industrial wastes into Lake Michigan, effluents from eight of the 16 major dischargers were surveyed. The companies surveyed were a pharmaceutical manufacturer, a coal-powered generating station, a flour mill and cereal plant, an outboard motor manufacturer, a smelter, two steel plants, and an oil piping company. The surveys included characterization of effluents, analysis of treatment facilities and procedures, feasibility of waste recycling, and some recommendations for improvement of treatment procedures. In terms of volume, the largest discharges to the lake were cooling waters. (Little-Battelle)
W74-02954

SOME ASPECTS OF THE BIOLOGY OF CALLIOPIUS LAEVIUSCULUS (KROYER) (CRUSTACEA, AMPHIPODA) IN THE NORTHWESTERN ATLANTIC,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
D. H. Steele, and V. J. Steele.
Canadian Journal of Zoology, Vol 51, No 7, p 723-728, July 1973. 5 fig, 2 tab, 9 ref.

Descriptors: *Sexual maturity, *Life cycles, *Aquatic habitats, *Crustaceans, *Atlantic Ocean, Population, Distribution patterns, Size, Fecundity, Water temperature, Zoolplankton, Seasonal.
Identifiers: *Calliopius laeviusculus, Macroinvertebrates.

Calliopius laeviusculus, a small amphiopod, was collected from several locations in the northwestern Atlantic, primarily in eastern Newfoundland, to study their biology. The organisms were not most commonly found attached to algae on rocky shores with moderate wave exposure. Populations peaked in late summer when the animals swarm at the surface and may than be found in the plankton far out to sea or on protected shores. They appear to be confined to areas with positive mean monthly summer temperatures not exceeding about 22C. Fifty percent of the females were calculated to be mature at 5.6 and 6.7 mm in the summer and winter respectively in Newfoundland waters, but, in Labrador, maturity was not achieved in females up to 10 mm in length. In Newfoundland several generations are produced per year and the females may have more than one brood. However, the females are in the resting stage between August and November-December, and young are only released from spring until late summer. In Labrador, where only one generation is produced per year, young are released in the spring but probably do not reach maturity until the autumn. In Newfoundland fecundity does not vary seasonally. (Little-Battelle)
W74-02958

SURVIVAL OF BACTERIA IN EXTREME ENVIRONMENTS,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 05C.
W74-02962

NATURAL HABITAT OF CARYOPHANON LATUM,
Mount Allison Univ., Sackville (New Brunswick). Dept. of Biology.
W. C. Trentini, and C. Machen.
Canadian Journal of Microbiology, Vol 19, No 6, p 689-694, June 1973. 1 fig, 3 tab, 7 ref.

Descriptors: *Farm wastes, *Water pollution sources, *Pollutant identification, *Isolation, *Habitats, Domestic animals, Bacteria, Cattle, Cultures, Methodology, Sampling, Sheep, Hogs, Hay, Grains (Crops), Pastures, Soils, Aerobic bacteria.
Identifiers: *Caryophanon latum, Schizomycetes, Environmental samples, Enrichment, Pure cultures, Mixed cultures, Fecal bacteria, Feces, Horses, Salvia, Rumen fluid.

When samples of fresh dung from pigs, horses, sheep, or cattle were enriched to encourage the growth of Caryophanon latum, the organism was found to be specifically associated with cattle dung. Several sheep dung samples were found to be positive for C. latum, but all were taken from a pasture where sheep and cattle were grazed together. All samples taken from sheep not pastured with cattle were negative. Autoclaved samples of cattle, horse, and sheep dung all supported growth and natural morphology of C. latum after 1-4 days exposure. Control samples exposed to air in areas far removed from cattle were uniformly negative. Aseptically collected 'free catch' samples from cattle were mainly negative, as were samples collected from the fistulated rumen. Enrichment of various other sources was undertaken. Total findings support the hypothesis that C. latum is a natural, specific, and temporary resident of cattle dung and is dispersed to new droppings by contaminated air and also probably by flying insects or cattle movement. (Holoman-Battelle)
W74-02966

OBSERVATIONS ON UPSTREAM MIGRATION BY IMAGINES OF SOME PLECOPTERA AND EPHEMEROPTERA,
Odense Univ. (Denmark). Biological Inst.
B. L. Madsen, J. Bengtson, and I. Butz.
Limnology and Oceanography, Vol 18, No 4, p 678-681, July 1973. 1 fig, 1 tab, 9 ref.

Descriptors: *Aquatic insects, *Mature growth stage, *Migration patterns, Mayflies, Stoneflies, Upstream, Downstream, Sexual maturity, Spatial distribution.
Identifiers: *Imagines, Imagoes, Brachyptera risi, Caenis rivulorum, Baetis rhodani, Baetis vernus, Ephemerella ignita, Nemoura cinerea, Nemoura flexuosa.

The migration of the imagines of some stream insects was investigated using sticky traps prepared with transparent polyethylene sheets to which had been applies a layer of sticky adhesive (Tanglefoot). The sheets were set up transversely over the stream, using a wooden frame or wires with one sticky side facing upstream and the other downstream. The plecopteran Brachyptera risi showed upstream migration; Nemoura sp. did not. The ephemeropterans Caenis rivulorum, Baetis (rhodani and vernus), and Ephemerella ignita all showed upstream migration. (Holoman-Battelle)
W74-02967

DECOMPOSITION OF MARINE COPEPODS,
Dalhousie Univ., Halifax (Nova Scotia). Inst. of Oceanography.
For primary bibliographic entry see Field 05A.
W74-02973

LIPOLYTIC BACTERIA IN THE OTTAWA RIVER,
Ottawa Univ. (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 05A.
W74-02975

ESCHERICHIA COLI SEROGROUPS ISOLATED FROM STREAMS IN PENNSYLVANIA, 1965 TO 1972,
Pennsylvania State Univ., University Park. Dept. of Veterinary Science.
For primary bibliographic entry see Field 05A.
W74-02988

DIFFUSION,
Deutsches Hydrogaraphisches Institut, Hamburg (West Germany).
H. Weidemann.
In: North Sea Science; Proceedings of NATO North Sea Science Conference, November 15-20, 1971, Aviemore, Scotland: Massachusetts Institute of Technology, p 58-72, 1973. 4 fig, 38 ref.

Descriptors: *Diffusion, *Advection, *Dispersion, *Sea water, Thermal stratfication, Ocean currents, Tides, Turbulence, Mixing, Path of pollutants.
Identifiers: *North Sea.

One of the most important physical properties of the marine environment, with respect to pollution questions, is its capability to transport substances injected at any point to other, distant places. Two different dynamic processes are responsible: advection by currents; and diffusion due to turbulent motions. The shape of a patch which develops from an originally circular or point source does not usually remain circular. In most cases, it becomes more or less elliptical or elongated, due mainly to vertical current shear. Sometimes it is torn into several parts, particularly when and where current divergences or large-scale eddies occur. The distributions measured during calm weather tend to show greater elliptical eccentricity than those obtained during rough weather periods. Substances released at the surface are gradually transported downward by vertical diffusion processes, but only as far as the depth of the thermocline. The vertical current shear, particularly with wind drift currents, results in an unsymmetric cross-section of the patch: at the windward end, the concentration at the surface will be less than in the deeper layers, while at the downwind end the contamination is concentrated in a surface layer which is shallow compared with its depth in the center of the patch. (Knapp-USGS)
W74-03030

MUD IN THE NORTH SEA,
University of East Anglia, Norwich (England). School of Environmental Sciences.
For primary bibliographic entry see Field 02J.
W74-03031

SEDIMENT DISTRIBUTION IN THE NORTH SEA IN RELATION TO MARINE POLLUTION,
Netherlands Inst. of Oceanography, Texel.
D. Eisma.
In: North Sea Science; Proceedings of NATO North Sea Science Conference, November 15-20, 1971, Aviemore, Scotland: Massachusetts Institute of Technology, p 131-150, 1973. 6 fig, 52 ref.

Descriptors: *Bottom sediments, *Sediment transport, *Path of pollutants, Sea water, Mercury, Industrial wastes, Water pollution sources, Ocean circulation, Currents (Water).
Identifiers: *North Sea.

The bottom sediments of the North Sea are chiefly of Holocene age and only a few meters thick, covering sediments and a surface relief mainly formed during the Pleistocene. The presence of increasing amounts of waste mercury from the Rhine in Dutch Wadden Sea sediments points to a large scale accumulation of mercury in that area. It is important to look for accumulation of waste substances other than mercury in the sediments and to do so in all areas of active sedimentation: the Wadden Sea, the estuaries, the fjords, the deep channels in the North Sea, the inner German Bight, and the Skagerrak, and the Norwegian Trough. In addition, the areas where iron hydroxides are being deposited may be important, as is probably the case off the Rhine-Meuse estuary and near the Thames, and at or near the areas where waste acids are being disposed of. There are three good reasons for determining, besides the fundamental physical and chemical processes involved, the distribution and the possible fate of waste substances in the bottom sediments of the North Sea: (1) the present lack of knowledge concerning seabed pollution; (2) the desirability to obtain good measurements of dissolved oxygen; and (3) the need to be able to predict the consequences of regulations and certain practices and accidents, especially on a long-term basis. (Knapp-USGS)
W74-03033

OCCURRENCE AND BEHAVIOUR OF HEAVY METALS IN RIVER DELTAS, WITH SPECIAL REFERENCE TO THE RHINE AND EMS RIVERS,
Institute for Soil Fertility, Groningen (Netherlands).
A. J. De Groot.
In: North Sea Science; Proceedings of NATO North Sea Science Conference, November 15-20, 1971, Aviemore, Scotland: Massachusetts Institute of Technology, p 308-325, 1973. 5 fig, 5 tab, 9 ref.

Descriptors: *Path of pollutants, *Heavy metals, *Mercury, Water pollution sources, Rivers, Industrial wastes.
Identifiers: *Rhine River (Netherlands).

The contents and behavior of a number of heavy metals in the suspended material of the highly polluted Rhine are described, together with the situation in the unpolluted estuary of the Ems. The fates of heavy metals in suspended matter (mud) can only be studied efficiently, however, if the transport paths of the material from the rivers to the marine coastal areas are well known. The load of heavy metals of the Rhine water fluctuates; the mean contents of As and Hg, however, are 5.6 and 0.3 micrograms per liter, respectively. Upstream there is a more pronounced occurrence of Hg, As, and Cu in the suspended materials, so the transport of these metals mainly takes place in a solid form. Downstream from the freshwater tidal area of the river, however, some metals are mobilized more or less, going into solution in the surrounding water as organometallic complexes. (Knapp-USGS)
W74-03034

THE LIQUID WASTE FACILITIES FUNCTION CONCEPT.
Charlotte, N.C. USAC Project.
For primary bibliographic entry see Field 05D.
W74-03039

WATER WELL STANDARDS--ARROYO GRANDE BASIN, SAN LUIS OBISPO COUNTY,
California State Dept. of Water Resources, Sacramento.
J. F. LoBue, and L. J. Olsen.
Available from State of California, Documents Section, P.O. Box 20191, Sacramento, Calif 95820 - Price $1.50. Bulletin No 74-7, July 1971. 35 p, 4 fig, 5 tab, 30 ref.

Descriptors: *Groundwater resources, *Water wells, *Well regulations, *Design criteria, *California, Legal aspects, Water pollution sources, Infiltration, Groundwater movement, Aquifer characteristics, Barriers, Cements, Sewage, Irrigation water, *Water quality standards.
Identifiers: *Well design.

During the past 20 years, considerable public and private concern has been expressed over the high nitrate concentration in the groundwater of the Arroyo Grande Basin of San Luis Obispo County, which lies within the Arroyo Grande hydrologic subarea of California. Groundwater degradation by nitrate has generally coincided with increased water use and waste discharge in the basin. In localized areas, irrigation return water, sewage, and other poor quality water have migrated downward into the water-bearing zones and have impaired the groundwater for certain beneficial uses. Standards are established to prevent impairment of water quality resulting from (a) improperly constructed wells; (b) improperly destroyed wells; or (c) defective wells. They apply also to those wells in use requiring modification and to those to be destroyed. The standards should be used in well construction or destruction in the Arroyo Grande subarea. However, in some parts of the basin, groundwater conditions necessitate supplementing statewide well standards. For example, because the deeper aquifers usually contain better quality water than the shallower, measures must be taken to seal off wells in the shallower aquifers to prevent the impaired water from invading the deeper aquifers. (Woodard-USGS)
W74-03057

DETERMINATION OF PHOSPHORUS IN WASTE WATERS FROM THE PULP AND PAPER INDUSTRY,
Institute of Paper Chemistry, Appleton, Wis. Div. of Natural Materials and Systems.
For primary bibliographic entry see Field 05A.
W74-03069

CHARACTERIZATION OF SULFITE PULP BLEACHING EFFLUENTS AND THEIR BEHAVIOR DURING BIODEGRADATION (ABWASSERTECHNISCHE CHARAKTERISIERUNG VON SULFITZELLSTOFFBLEICHEREI-ABWASSERN UND DEREN VERHALTEN BEIM BIOLOGISCHEN ABBAU),
For primary bibliographic entry see Field 05D.
W74-03073

TOXICITY OF SODIUM SULFIDE TO COMMON SHINERS -- DYNAMIC BIOASSAY,
Institute of Paper Chemistry, Appleton, Wis. Div. of Industrial and Environmental Systems.
For primary bibliographic entry see Field 05C.
W74-03075

LONG-TERM STABILITY OF WASTE LIGNINS IN AQUATIC SYSTEMS,
Swedish Water and Air Pollution Research Lab., Stockholm.
H. O. Bouveng, and P. Solyom.
Svensk Papperstidning, Vol 76, No 1, p 26-29, January 20, 1973. 6 fig, 4 tab, 6 ref.

Descriptors: *Lignins, *Pulp wastes, *Bleaching wastes, *Biodegradation, *Water pollution sources, Pine trees, Coniferous trees, Chlorination, Degradation (Decomposition), Industrial wastes, Pulp and paper industry, Effluents, Pollutants, Sulfonates, Freshwater.
Identifiers: *Spruce trees, Kraft lignin, Kraft mills, Lignosulfonates, Spent sulfite liquor, Sulfite mills, Oxygen bleaching, Alkaline extraction.

The organic content of lignin-containing pine kraft pulp mill effluents underwent ca. 94% degradation in freshwater within 40 weeks, whereas only 60% of the organic load in spruce sulfite mill effluents was degraded in the same time, the remaining 40% remaining biologically stable. Effluents from pine kraft pulp bleaching stages (chlorination, alkaline extraction, and oxygen bleaching) showed stabilities comparable to those of lignosulfonic acids. These findings, obtained under conditions of enhanced biological activity, are better than the decomposition rates to be expected under industrial conditions. They show also that organic matter in ligniferous pulp mill effluents comprises two distinct fractions, one being readily biooxidized in 10 weeks, the other remaining practically unaffected, except for waste lignin from kraft digestions ofwhich about 70% is removed beyond 10 weeks' time. (Brown-IPC)
W74-03078

A FLUORIMETRIC DETERMINATION OF LIGNIN SULFONATES FROM NATURAL WATERS IN PRESENCE OF HUMIC SUBSTANCES,
Gotenburg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 05A.
W74-03079

THE EFFECT OF PULP AND PAPER MILL EFFLUENTS ON TASTE AND ODOUR OF THE

RECEIVING WATER AND THE FISH THEREIN,
Domtar Ltd. Research Centre, Senneville (Ontario).
W. H. Cook, F. A. Farner, O. E. Kristiansen, K. Reid, and J. Reid.
Pulp and Paper Magazine of Canada, Vol 74, Convention issue, p 97-106 (Technical Paper T113-122), March 1973. 2 fig, 15 tab, 7 ref.

Descriptors: *Pulp wastes, Fish, *Pollutant identification, *Odor, *Taste, *Bleaching wastes, *Bioassay, Water analysis, Waste water (Pollution), Pulp and paper industry, Organoleptic properties, Costs, Water pollution treatment, Waste water treatment, Sulfite liquors, *Canada.
Identifiers: Kraft mills, Sulfite mills, Vanillin.

Effluent sources in the Cornwall (Ontario) mill of Domtar Fine Papers Ltd. which contribute most to the taste, odor, and fish tainting potential have been identified, and the effects of various kraft and sulfite pulp and paper mill effluents (including bleach plant and vanillin manufacturing wastes) on the receiving water and on fish have been studied. The effectiveness of various laboratory and pilot plant treatments was determined by chemical analysis for the most common pollutants and by organoleptic evaluation of taste and odor thresholds and fish flavor. Comparisons of capabilities and costs for the most promising control treatments have been made. (Brown-IPC)
W74-03085

BIOLOGICAL SURVEYS: INTENT, METHODOLOGY, INTERPRETATION,
MacMillan Bloedel Ltd., Powell River (British Columbia). Powell River Div.
For primary bibliographic entry see Field 05C.
W74-03086

DISPERSION OF POLLUTANTS IN SATURATED POROUS MEDIA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
A. K. Tyagi, and D. K.Todd.
Available from the National Technical Information Service as PB-226 596 $3.00 in paper copy; $1.45 in microfiche. Paper presented at Fall Meeting of American Geophysical Union, December, 1971. 14 p, 7 fig, 13 ref. OWRR B-020-ARIZ (2).

Descriptors: *Path of pollutants, *Saturated flow, *Porous media, *Tracers, Mathematical studies, Forecasting, Equations, Groundwater movement, Diffusion, Dispersion, Analytical techniques, Water pollution sources, Hydrogeology.

An analytic solution has been derived to predict the dispersion of pollutants in homogeneous, isotropic and saturated porous media. In order to define the dispersion phenomenon, the coefficients of longitudinal and transverse dispersion must be determined. Relationships for the two coefficients under specific boundary conditions are presented. Since the variables characterizing the properties of fluid, porous medium, and tracer influence the dispersion of a pollutant, two dimensionless parameters, namely, the inverse Schmidt number and the molecular Peclet number, were obtained. Using these parameters, the experimental data on longitudinal and transverse dispersion were compiled and analyzed over a wide range of the flow velocity, grain size, and molecular diffusion of tracer. Good comparisons were obtained between observed and predicted coefficients of dispersion. (Woodard-USGS)
W74-03093

PROCESSES CONTRIBUTING TO THE NUTRIENT DISTRIBUTIONS OFF THE COLUMBIA RIVER AND STRAIT OF JUAN DE FUCA,
Washington Univ., Seattle. Dept. of Oceanography.
U. Stefansson, and F. A. Richards.
Limnology and Oceanography, Vol 8, No 4, p 394-410, October 1963. 11 fig, 2 tab, 19 ref.

Descriptors: Washington, Oregon, *Columbia River, *Nutrients, *Estuaries, *Upwelling, Seasonal, *Mixing, Silicates, Nitrates, Phosphates, Dissolved oxygen.
Identifiers: R/V Brown Bear, *Strait of Juan de Fuca, River plumes.

The distribution of salinity, dissolved oxygen, silicate, nitrate, and phosphate off the Washington and Oregon coasts, both inside and outside the Columbia River plume, were observed during 12 cruises of the RV Brown Bear between January 1961 and April 1962. Nutrients are supplied to the surface waters off the Washington and Oregon coasts from rivers and from the deeper layers of the ocean. The deep water enters the surface layers by entrainment, especially in the estuarine-like circulation in the Strait of Juan de Fuca; by upwelling, particularly off the Oregon coast in summer; and by upward mixing into the photic zone. The most important river source of nutrients is the Columbia River, which supplies high concentrations of phosphate and nitrate to its 'plume,' those waters appreciably diluted by its admixture. In winter, the plume waters are approximately simple mixtures of Columbia River and surface seawater, and their silicate and nitrate concentrations can be predicted from the salinity. In the spring and summer, nutrients are also added by the admixture of upwelled deep water and removed by photosynthetic fixation. The amounts thus added or removed have been estimated as departures, or anomalies, from the composition of simple mixtures of river and surface seawaters. These anomalies are compared with each other, with the average composition of plankton material, and with other evidences of biological activity, both in terms of correlations with each other and of horizontal distributions in the upper 10 m. (Sinha-OEIS)
W74-03101

A STUDY OF WATER CIRCULATION IN MONTEREY HARBOR USING RHODAMINE B DYE,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 02L.
W74-03114

ENVIRONMENTAL LEVELS OF RADIOACTIVITY AT ATOMIC ENERGY COMMISSION INSTALLATIONS.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 05A.
W74-03136

5C. Effects of Pollution

GROWTH OF AN ADHERENT MIXED MICROBIAL CULTURE IN A SUBSTRATE LIMITED SINGLE STATE CHEMOSTAT,
Ohio State Univ., Columbus. Dept. of Microbiology.
R. M. Pfister.
Available from the National Technical Information Service as PB-226 309 $2.75 in paper copy, $1.45 in microfiche. Ohio State University Project Completion Report No. 391X, September 1973. 14 p, 1 fig, 5 tab, 14 ref. OWRR A-021-OHIO (1).

Descriptors: Microorganisms, *Aquatic microorganisms, Nutrient requirements, Secondary productivity, Food webs, *Food chains, Cultures, *Bacteria, *Ecosystems.
Identifiers: Chemostat.

The objective was to develop a continuous culture system with two bacterial cultures, one of which was adherent to the wall of the chemostat. By developing such a laboratory model, microbial interactions in certain aquatic ecosystems (e.g. river sediments) can be further understood. A steady-state was established between a Chromobacterium lividum and a Pseudomonas sp. at a dilution rate of 0.27 hr-1 when the growth limiting substrate was citrate. During both pure and mixed continuous culture studies the C. lividum adhered to the wall of the chemostat and the Pseudomonas showed no such tendency visually. This system offers a convenient model for studying the importance of bacterial adherence to certain aquatic ecosystems such as river sediments and sewage treatment.
W74-02661

PARTIAL RECOVERY OF A VEGETATION IN A POLLUTION DAMAGED MARSH,
Massachusetts Univ., Amherst. Water Resources Research Center.
C. J. Burk.
Available from the National Technical Information Service as PB-226 303 $3.00 in paper copy, $1.45 in microfiche. Publication No. 27, February 1973. 28 p, 6 fig, 3 tab, 9 ref. OWRR A-042-MASS (1).

Descriptors: *Vegetation regrowth, *Pollution abatement, Massachusetts, Revegetation, Mathematical studies, Computer programs, Aquatic plants, Birds, Varieties, Wild rice, Marshes, Marsh plants.
Identifiers: *Arcadian Wildlife Sanctuary (Mass.), Northampton (Mass.), Mill River (Mass.), Ricecutgrass, Water clover, Shannon-Weiner function, Pickerelweed.

Partial recovery of vegetation in a damaged freshwater marsh (Arcadia Wildlife Sanctuary at the mouth of the Mill River in Northampton, Massachusetts) after major sources of pollution were eliminated is described. A municipal dump was relocated and increasingly strict restrictions on release of industrial waters were imposed. Two industries, previously major sources of pollution, installed or were installing treatment methods. Vegetation diversity was measured by species richness, total number of species sampled, average number of species per quadrat, and the Shannon-Wiener function, an index of information content. Diversity by each of these criteria was greater in all zones in 1971 than in 1969. Total coverage also increased in all zones throughout this period. Those species initially present within each zone at the beginning of the study period accounted for much of the increase in cover while species formerly absent from sampled areas within each zone contributed most of the increased diversity. Rice cutgrass (Leersia oryzoides), dominant pioneer on exposed sediments in the Mill River ecosystem, showed a striking increase in coverage. Water clover (Marsilea quadrifolia), an exotic species associated with man-made disturbance along the lower portions of the stream, invaded the marsh during 1969, a period of extreme disturbance, and persisted throughout the recovery period. (Jones-Wisconsin)
W74-02663

THE BIOGEOCHEMISTRY OF DEVILS LAKE, NORTH DAKOTA,
North Dakota Univ., Grand Forks. Dept. of Biology; and North Dakota Univ., Grand Forks. Dept. of Geology.
R. Tubb, D. W. Anderson, R. Armstrong, and E. Callender.
Available from the National Technical Information Service as PB-226 306 $3.75 in paper copy, $1.45 in microfiche. North Dakota Water Resources Research Institute Technical Completion Report WI-221-017-73, June 1973. 90 p. 18 fig, 14 tab, 70 ref. OWRR A-006-NDAK (3). 14-01-001-804, 14-01-001-979.

Descriptors: *Limnology, *Biochemistry, *Geochemistry, *North Dakota, Zooplankton, Primary productivity, Phytoplankton, Water chemistry, Alkalinity, Calcium, Magnesium, Sodium,

Potassium, Chlorides, Sulfates, Iron, Silica, Interstices, Sediments, Particle size, History, Sands, Gravels, Clays, Silts, Analytical techniques, Carbonates, Phosphorus, Nitrogen, Hydrogen ion concentration, Oxidation-reduction potential, Mineralogy, Salinity, Iowa, Nannoplankton.
Identifiers: *Devils Lake (N.D.), Holocene chronology.

Plans to restore North Dakota's Devils Lake to a higher level through diversion of Missouri River water prompted study of the physical, biological, and chemical conditions to determine the lacustrine system and how it evolved. Circumstantial evidence shows that ultraplankters are responsible for virtually all of the productivity. Total annual production, in spite of the relatively short growing season, qualifies Devils Lake as highly productive or eutrophic. Energy budget showed a net loss of potential energy from the system even though total annual gross production was rather high and zooplankton grazing was the most important factor controlling size of phytoplankton standing crop. Salinity date indicate the lake was fresh approximately 150 years ago. Inorganic precipitation of high-magnesian calcite results from very high carbonate supersaturation caused by phytoplankton photosynthesis. Depositional rate of authogenic chemical components has generally decreased with increasing age. Sulfate content of interstitial water sediment can be used to estimate paleosalinity variation during the past 6000 years. Low metastable carbonate content of shallow-water sediment indicates frequent exposure to 'fresh' surface-water and groundwater seepage. Lake level has fluctuated considerably during the past 6000 years. (Jones-Wisconsin)
W74-02664

STUDIES ON SELECTED MYXOBACTERIA PATHOGENIC FOR FISHES AND ON BACTERIAL GILL DISEASE IN HATCHERY--REARED SALMONIDS,
Bureau of Sport Fisheries and Wildlife, Kearneysville, W. Va. Eastern Fish Disease Lab.
G. L. Bullock.
U S Bur Sport Fish Wildl Tech Pap. 60. p 3-30. 1972. Illus.
Identifiers: Bacterial diseases, Chondrococcus-columnaris, Cytophaga-psychrophila, Fish, Hatchery, *Myxobacteria (Pathogenic), *Salmonids (Gill disease).

Morphological, physiological and serological studies on 55 myxobacteria isolated principally from gill disease, tail rot and other myxobacterial infections showed that a variety of myxobacteria occur in these infections. Although there were different morphological types of myxobacteria, all strains from freshwater and estuarine sources were physiologcally similar. Isolates from marine sources were physiologically less active than the other test organisms. Agglutinin reactions of test myxobacteria showed many types; serological relationships of many of the test strains to Chondrococcus columnaris and Cytophaga psychrophila were shown by the agar gel precipitin reactions. Studies on fingerling trout showed that gill disease can be induced within 2 wk by crowding, exposure to ammonia and low oxygen and factors not measured. When live diseased fingerlings were added to aquarium water containing stressed trout the disease occurred within a week; attempts to transmit gill disease to stressed trout with cultures of myxobacteria, with other eubacteria isolated from diseased tissue, or with dead diseased fingerlings were unsuccessful. Bacterial gill disease failed to develop in trout exposed to 0.5-2.5 ppm ammonia, 4.0-5.0 ppm dissolved oxygen, or to both ammonia and low oxygen. Three species of yearling trout from 4 hatcheries were found to have low levels of agglutinins against myxobacteria isolated from gill disease, tail rot and trout skin. Cross absorption studies with 10 of these cultures indicated common antigens.--Copyright 1973, Biological Abstracts, Inc.
W74-02672

THE POLLUTION POTENTIAL IN PESTICIDE MANUFACTURING.
Midwest Research Inst., Kansas City, Mo.

Available from the National Technical Information Service as PB-213 782, $6.75 in paper copy, $1.45 in microfiche. Environmental Protection Agency, Rural Wastes Branch, Technical Studies Report TS-00-72-04, June 1972. 275 p, 46 fig, 28 tab, 3 append. EPA-OWP 69-01-0142.

Descriptors: *Pesticides, *Hazards, *Pesticide residues, *Environmental effects, Formulation, Marketing, Volume, Industries, Waste treatment, Waste disposal, Air pollution, Pollutants, Water pollution, Toxicity, Economic impact, Water pollution control, Estimated costs, Storage, Waste water treatment, Incineration.
Identifiers: *Pollution potential, *Pesticide industry, Pesticide manufacture, Detoxification.

Although pesticide use has resulted in positive benefits, it has been achieved only with some undesirable side-effects. The present study surveys and evaluates the potential environmental pollution associated with the manufacture, formulation, and marketing of pesticides. A complete and detailed survey of current production volumes was inhibited due to restrictions on disclosure of the data, however an estimate based on categorized and grouped data available through the Tariff Commission indicated that the 13.4 billion pounds per year pesticide market is dominated by 24 products or product groupings which account for 64% of this production. The remaining 26% is divided between about 250 other pesticides. Twenty-two representative pesticides were selected for intensive study of pollution associated with their manufacture. Preliminary review indicated that sizable losses of potential pollutants occur during the pesticide production process which are not detoxified by existing waste treatment facilities. Formulators of pesticides were found to have less extensive waste treatment facilities although their short formulation runs generate considerable waste. Development of principles and procedures for minimizing waste generation and release for both normal and emergency conditions are urgently recommended. (Weaver-Wisconsin)
W74-02685

AN ECOLOGICAL STUDY ON THE SO--CALLED MOGAI (ANADARA SUBCRENATA (LISCHKE)) CULTURED IN THE KASAOKA BAY (IN JAPANESE),
Hiroshima Univ. (Japan). Faculty of Fisheries and Animal Husbandry.
Y. Y. Ting, S. Kasahara, and N. Nakamura.
J Fac Fish Anim Husb Hiroshima Univ. Vol 11, No 1, p 91-110. 1972. Illus. (English summary).
Identifiers: *Anadara-subcrenata, Bays, *Ecological studies, Fertilization, *Japan (Kasaoka Bay), Maturation, Mogai, Salinity, Spawning, Water pollution, Industrial wastes, Bivalves.

The so-called 'Mogai,' A. subcrenata (a kind of ark shell) is one of the most important bivalves in the Seto Indland Sea, but in recent years the area of its culturing grounds is gradually decreasing due to reclamation works and water pollution through the release of industrial wastes. This study was carried out mainly to clarify the environmental conditions of Mogai culturing grounds in Kasaoka Bay, Okayama Prefecture (Japan); the growth of Mogai as well as the maturation of gonad; the artificial inducing of spawning and the effect of chlorinity upon the fertilization and the early development.--Copyright 1973, Biological Abstracts, Inc.
W74-02690

LOWER FUNGI AS TEST ORGANISMS OF POLLUTANTS IN SEA AND BRACKISH WATER: THE EFFECTS OF HEAVY METAL COMPOUNDS AND PHENOL ON THRAUSTOCHYTRIUM STRIATUM (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Meereskunde.
J. Schneider.
Mar Biol (Berl). Vol 16, No 3, p 214-225. 1972. Illus. (English summary).
Identifiers: *Brackish water, Compounds, *Fungi, *Heavy metals, Organisms, *Phenols, Pollutants, *Sea water, Tests, *Thraustochytrium-striatum, Toxicity, Water pollution.

Three test-series were applied, which differed in regard to the basal medium (natural or artificial sea water, salinity level, addition of detergent); the culture conditions (primary cultures, subcultures, back-inoculations into basal medium without toxic metals); the criterion employed (zoospore activity, sporangia development, or dry weight of T. striatum Schneider). The temperature applied was 18-20C. The sea water-pollen-method (MWP) was the most suitable: it is simple and more sensitive than the other tests; subcultures and back-inoculations are possible without much additional work; conditions simulate nature; first results are available after 3-4 days. The SMS-method (enriched natural sea water of different salinities) provides additional information on salinity effects. Nine substances were tested: (CH3COO)2Hg, HgCl2, CdCl2.H2O, ZnSO4.7H2O, NiSO4.7H2O, CuSO4.5H2O, CoCl2.6H2O, MnCl2.4H2O, and phenol. In regard to their toxicity these substances can be divided into 2 groups: Hg - and Cd-salts inhibit development down to greater dilutions than the remainder; Zn and Ni seem to yield intermediate effects. Salinity modifies the toxic effects of the test substances. In higher salinities, comparable concentrations of test substances reveal stronger inhibitory effects than in lower salinities. Detergents may augment the toxic effects, at least of CuSO4. The marine lower fungus T. striatum is a useful organism for testing biological consequences of water pollutants.--Copyright 1973, Biological Abstracts, Inc.
W74-02696

CONTRIBUTION TO KNOWLEDGE ABOUT THE ALGAE (EXCLUDING BACILLARIOPHYCEAE) OF STAGNANT WATERS OF THE IRON GATES OF THE DANUBE,
Academia R. S. R., Cluj. Centrul de Cercetari Biologice.
L. S. Peterfi.
Stud Cercet Biol Ser Bot. Vol 24, No 3, p 199-211. 1972. Illus.
Identifiers: *Algae, *Bacillariophyceae, Chlorangium-epizooticum, Chlorella-luteoviridis, Chlorophyceae, *Danube River, Desmidiaceae, Euglenophyceae, *Romania, Scotiella-levicostata, Stagnant waters, Artificial lakes.

A list of algae of stagnant waters situated between Moldova Veche and Ada-Kaleh (Romania), which will be flooded by waters of an artificial lake formed by the Iron Gates of the Danube, was compiled. Identified were 237 algal taxa (excluding diatoms) predominantly Euglenophyceae, Chlorophyceae, and Desmidiaceae. Identified as new for Romania were Chlorella fusca Shihira et Kraus, C. luteoviridis Chodat, Scotiella levicostata Hollerb. and Chlorangium epizooticum (Korshikov) Ettl.--Copyright 1973, Biological Abstracts, Inc.
W74-02699

TRACE METALS IN A TUNDRA POND: VARIATIONS IN CONCENTRATION AND THEIR EFFECT ON PHYTOPLANKTON POPULATIONS,
Alaska Univ., College. Inst. of Marine Science.
For primary bibliographic entry see Field 02H.
W74-02726

THE INFLUENCE OF DISSOLVED HUMIC SUBSTANCES ON TRACE METAL PHOTOTOXICITY,
Alaska Univ. College. Inst. of Marine Science.
For primary bibliographic entry see Field 02H.
W74-02727

EFFECTS OF MIGRATORY WATERFOWL ON WATER QUALITY AT THE MONTEZUMA NATIONAL WILDLIFE REFUGE, SENECA COUNTY, NEW YORK,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 05B.
W74-02733

STREAM CHANNELIZATION (PART 5).
For primary bibliographic entry see Field 06G.
W74-02777

STREAM CHANNELIZATION (PART 6).
For primary bibliographic entry see Field 06G.
W74-02778

ACTIVE PROJECTS, PURE WATERS RESEARCH.
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 05D.
W74-02851

4 WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-02856

AN ANNUAL PLANKTON CYCLE ON THE CHESAPEAKE BAY IN THE VICINITY OF CALVERT CLIFFS, MARYLAND, JUNE 1969 - MAY, 1970,
Academy of Natural Sciences of Philadelphia, Pa. Dept. of Limnology; and Academy of Natural Sciences of Philadelphia, Benedict Md. Benedict Estuarine Lab.
R. A. Mulford.
Proceedings of the Academy of Natural Sciences of Philadelphia, Vol 124, No 3, p 17-40, November 24, 1972. 6 fig, 13 tab, 19 ref.

Descriptors: *Chesapeake Bay, *Aquatic microorganisms, Population, *Plankton, Zooplankton, Aquatic environment, Phytoplankton, Dinoflagellates, Diatoms, Hydrography, Seasonal, Distribution patterns, On-site data collections, Evaluation, Nuclear powerplants, *Thermal pollution, Maryland.
Identifiers: *Calvert Cliffs powerplant, Species diversity.

A submersible pump was used to obtain samples of net (10 micrometers) phytoplankton at surface and near bottom from four stations positioned along Chesapeake Bay in the vicinity of the proposed Calvert Cliffs Nuclear power plant. The study, conducted for 11 months, yielded information on the succession, abundance and diversity of phytoplankton. Data indicate that 13 species of diatoms, 1 dinoflagellate species and tintinnids as a group represent the greatest percentage of the community throughout the annual cycle. The above species, along with total population diversity, and a list of predicted seasonal dominant organisms are discussed. (Jerome-Vanderbilt)
W74-02863

CALEFACTION OF THE CONNECTICUT RIVER, U.S.A.,
Yale Univ., New Haven, Conn. Dept. of Biology.
For primary bibliographic entry see Field 05B.
W74-02864

WATER USE FOR AQUATIC LIFE,
La Salle Coll., Philadelphia, Pa. Dept. of Biology.
C. B. Wurtz.
Water Quality Criteria, American Society for Testing and Materials, Special Technical Publication 416, Philadelphia, p 81-89, 1967. 6 ref.

Descriptors: *Water quality standards, *Aquatic life, *Pollutants, *Standards, Water quality, Aquatic environment, Temperature, Wastes, Effluents, Dissolved oxygen, Water pollution, Organic compounds, Industrial wastes, Sewage, Fish, Water utilization.

Aquatic life in general is quite tolerant of deteriorated water. Aquatic organisms vary in their responses to environmental alteration. Compared to the quality of water required for domestic and industrial uses, the aquatic life of the nation is not very demanding. To protect all water-use interests, pollution must be defined, criteria for natural waters developed, and standards for specific discharges fixed. It is probable that no single, equitable set of criteria for aquatic life can be established over a geographic area larger than the basin of a first-or second-order tributary of the major rivers. Water quality change brings about concomitant biological change, but extreme conditions must exist and be persistent before aquatic life is eliminated. Environmental control is essential if optimal conditions for aquatic life are to be developed and maintained. Waste disposal, properly controlled, need not conflict with the use of water for aquatic life. (Jerome-Vanderbilt)
W74-02865

TEMPERATURE TRENDS AND THE DISTRIBUTION OF GROUNDFISH IN CONTINENTAL SHELF WATERS, NOVA SCOTIA TO LONG ISLAND,
National Marine Fisheries Service, Woods Hole, Mass. Northeast Fisheries Center.
J. B. Cotton, Jr.
Fishery Bulletin, Vol 70, No 3, p 637-657, 1972. 12 fig, 46 ref.

Descriptors: *Temperature, Fish, *Marine fish, *Distribution patterns, Sea, Heated water, Spawning, Spatial distribution, *Water temperature, Atlantic Ocean, *Continental shelf.
Identifiers: Haddock, Flounder, Butterfish, Nova Scotia, Long Island, *Groundfish.

The 1953 to 1967 downward trend in seawater temperature in continental shelf waters between Nova Scotia and Long Island did not significantly alter the distribution of four species of groundfish. There was an extension of the southern range of American plaice and a contraction of the northern range of butterfish. These shifts in distribution were not extensive. The equatorward boundary of American plaice appears to be limited by summer temperatures too high for survival and the poleward boundary of butterfish by summer temperatures too low for reproduction. There was no obvious alteration in the geographic distribution of haddock and yellowtail flounder. The distribution and movements of haddock and yellotail flounder appear to be influenced more by restrictive spawning area and bottom type conditions than by temperature. (Oleszkiewicz-Vanderbilt)
W74-02867

THERMAL REQUIREMENTS FOR MATURATION, SPAWNING, AND EMBRYO SURVIVAL OF THE BROOK TROUT, SALVELINUS FONTINALIS,
National Water Quality Lab., Duluth, Minn.
K. E. F. Hokanson, J. H. McCormick, B. R. Jones, and J. A. Tucker.
Journal of the Fisheries Research Board of Canada, Vol 30, No 7, p 975-984, 1973. 6 fig, 5 tab, 28 ref.

Descriptors: *Brook trout, *Growth rates, *Water temperature, *Spawning, Aquatic environment, Fish, Temperature, Seasonal, Environmental effects, Reproduction, Growth, Water quality, Laboratory tests, Mature growth stage, Embryonic growth stage, *Thermal pollution.

Thermal requirements for brook trout reproduction were determined at a natural daylength cycle and five constant temperatures (10-21C) and one treatment that followed the seasonal temperature regime of Lake Superior. The optimum range for growth (unrestricted rations) and relative condition factor was 10-19C. Survival was 90% or greater and general growth and secondary sexual characteristics were well developed at all temperatures. The maximum temperature at which males became functionally mature was 19C and lower. Water temperature had influence on spawning activity and egg viability. The upper median effective temperature for the number of viable eggs spawned per female was 11.7C. The upper median tolerance limit for normal hatch was 12.7C. Thermal criteria that recognize seasonal changes in their thermal requirements are recommended for self-sustaining brook trout populations. (Jerome-Vanderbilt)
W74-02868

THE REALITIES OF THERMAL POLLUTION - ENVIRONMENTAL LIMITATIONS AND ECOLOGICAL ADAPTATIONS,
La Salle Coll., Philadelphia, Pa.
C. B. Wurtz.
Paper presented at 17th Southern Water Resources and Pollution Control Conference University of North Carolina, April 16-18, 1968. 11 p, 7 ref.

Descriptors: *Heated water, *Environmental effects, *Habitats, *Biological communities, Aquatic environment, Discharge (Water), Electric power production, Effluents, Aquatic animals, Fish, Adaptation, Temperature, On-site-data collections, Laboratory tests, Measurement, *Thermal pollution.

The effects of heated effluents on the biological communities of various aquatic habitats and the relative technological and economic merits of various environmental conditions are discussed. Although specific aquatic organisms survive best under certain thermal conditions it has been shown that most species can adapt to a fairly wide range of temperatures. Most aquatic life is found in a 73 degree temperature range from 32 F to 105 F. Field observations generally show an adaptive ability much greater than the 2 or 3 degrees F per hour rate claimed by many studies. It is accepted that a small temperature change can sometimes make a significant difference in the resident species composing the natural community of an aquatic habitat. But, it is suggested that the maintenance of the natural biological community is not always in the best interests of the human community. In some cases alteration of the aquatic habitat may be considered desirable. The modification of the Connecticut River is presented as an example of the thermal modification of an aquatic environment. Transport of wastes in natural waters is seen as a resource. (Jerome-Vanderbilt)
W74-02870

INFLUENCE OF TEMPERATURE ON ENERGY UTILIZATION OF EMBRYONIC AND PROLARVAL TAUTOG, TAUTOGA ONITIS,
National Marine Fisheries Service, Narragansett, R.I. Narragansett Lab.
G. C. Laurence.
Journal of the Fisheries Research Board of Canada, Vol 30, No 3, p 435-442, 1973, 1 fig, 3 tab, 19 ref.

Descriptors: *Temperature, *Fish, *Oxygen, Biochemistry, Aquatic environment, Reproduction, Growth rates, Growth stages, Metabolism, Fish eggs, Oxygen, Environmental effects.
Identifiers: *Tantog.

When daily energy budgets were calculated by two methods for tautog, Tautoga onitis, from fertilization to complete yolk absorption at three temperatures (16, 19 and 22 C), neither method indicated a deficiency of yolk energy for growth and metabol-

ism prior to exogenous feeding capability. Deficits were indicated on the day of feeding capability at all temperatures by the oxygen consumption method, the more precise but less inclusive of the two. The dry weight method, which gave the more conservative estimates, indicated no deficit for the entire period of yolk absorption at 16 C, a deficit one day after feeding capability at 19 C, and a deficit on the day of feeding capability at 22C. Regression analysis of oxygen consumption indicated that 22 C may be in the upper temperature limits for normal metabolism by embryonic and prolarval tautog. Yolk utilization efficiencies and postlarval size at complete yolk abosrption tended to be inversely related to temperature. The ecological implications and the effects of temperature on the critical timing involved in the interactions of feeding capability, availability of prey and occurrence of energy deficits are discussed. (Tirfie-Vanderbilt)
W74-02872

BIOCHEMICAL EFFECTS OF TEMPERATURE AND NUTRITIVE STRESS ON MYTILUS EDULIS L,
Natural Environment Research Council, Anglesey (Wales). Unit of Marine Invertebrate Biology.
P. A. Gabbott, and B. L. Bayne.
Journal of the Marine Biology Association of United Kingdom, Vol 53, No 2, p 269-286, 1b73, 6 fig, 8 tab, 17 ref.

Descriptors: Biochemistry, *Temperature, *Mussels, *Nutrients, Food abundance, Metabolism, Laboratory tests, Stress, Reproduction, Water pollution effects.

Mussels were subjected to low food levels and constant temperature (15 C) for prolonged periods in four experiments. The metabolic rate was low in autumn and the energy absorbed was equal to the energy demand. The oxygen consumption rapidly declined in spring as a result of stress. In the winter, animals were out of energy balance, using stored reserves. During stress the rate of amino-Ni efflux formed an important component of the energy budget. At temperatures above ambient in the winter the rate of gametogenesis was increased, which resulted in increased energy demand and high oxygen consumption. If food is scarce, part of this demand is met from stored reserves, primarily protein and carbohydrate. This ensures normal development of gametes in the winter. Later, when vitellogenesis is complete and reserves are depleted, stress results in rapid fall in oxygen consumption. There is a marked seasonal shift from a reliance on carbohydrate as the main energy reserve in the summer to a greater reliance on protein as the main reserve in the winter. (Tirfie-Vanderbilt)
W74-02873

EFFECTS OF TEMPERATURE ON EMBRYONIC DEVELOPMENT OF LAKE HERRING (COREGONUS ARTEDII),
Ministry of Natural Resources Thunder Bay (Ontario). Fisheries Research Branch.
P. J. Colby, and L. T. Brooke.
Journal of the Fisheries Research Board of Canada, Vol 30, No 6, p 799-810, 1973, 3 fig, 7 tab, 15 ref.

Descriptors: *Herrings, *Growth rates, *Embryonic growth stage, *Water temperature, Aquatic environment, Aquatic life, Fish, Lakes, Temperature, Time, Growth stages On-site data collections, Laboratory tests, Environmental effects, Mathematical models, Forecasting, Statistics, Regression analysis, *Michigan, *Thermal pollution.

Embryonic development of lake herring (Coregonus artedii) was observed in the laboratory at 13 constant temperatures from 0.0 to 12.1C and in Pickerel Lake (Washtenow County, Michigan) at natural temperature regimes. The rate of development during incubation was based on progression of the embryos through 20 indentifiable stages. An equation was derived to predict the development stage at constant temperatures on the general assumption that development stage is a function of time and temperature. The equation should also be useful in interpreting estimates from regressions that include other environmental variables that affect egg development. A second regression model derived primarily for fluctuating temperatures, related development rate at development stage, expressed as the reciprocal of time, to temperature. The time in the natural habitat correlated closely with the predicted rates of development. (Jerome-Vanderbilt)
W74-02878

THE COOLING WATER OF POWER STATIONS: A NEW FACTOR IN THE ENVIRONMENT OF MARINE AND FRESH-WATER INVERTEBRATES,
Central Electricity Generating Board, Southampton (England). Marine Biological Lab.
S. Markowski.
Journal of Animal Ecology, Vol 28, No 2, p 243-258, 1959, 2 fig, 6 tab, 3 ref.

Descriptors: *Thermal power plants, *Heated water, *Cooling water, *Aquatic animals, Electric power plant production, Thermal pollution, Environmental effects, Aquatic environment, *Marine animals, Mortality, Growth, Reproduction, On-site data collections, Intakes, Outlets, Effluents, Turbulence, Chlorination, Dissolved oxygen, Bioassay, Algicides, Condensation.
Identifiers: Great Britain.

A general picture of the conditions created by power stations in freshwater and marine environments and some information on the species involved and their response to those conditions are presented. Samples of intake and outfall water from 12 power plants located in areas where the conditions were altered as little as possible by the other industrial disturbances were collected and examined during 1955-7. Descriptions of an open versus closed and mixed cooling systems are presented in respect to their effects on aquatic organisms. The principal changes created by the use of water for power plant cooling are: the increase of pressure caused by pumps; the rise in temperature; the injection of chlorine; turbulence; and the conversion of the water into a heavy rainfall when passed through cooling towers. Each of these factors and its effects on aquatic life are discussed. The samples contained some 35 fresh water and 62 marine animal species were apparently unharmed by the by the temperature, turbulence, and chlorination of cooling water as the organisms found at the outfall were alive and able to reproduce. The oxygen content of the discharge water was either the same as that of the natural environment or higher. (Jerome-Vanderbilt)
W74-02879

OBSERVATIONS ON THE RESPONSE OF SOME BENTHONIC ORGANISMS TO POWER STATION COOLING WATER,
Central Electricity Generating Board, Southampton (England). Marine Biological Lab.
S. Markowski.
Journal of Animal Ecology, Vol 29, No 2, p 349-357 1960. 2 fig, 2 tab, 3 ref.

Descriptors: *Thermal power plants, *Cooling, *Thermal pollution, *Aquatic organisms, *Benthic fauna, Algae, Electric power plant, Heated water, Environmental effects, Aquatic environment, Metabolism, Reproduction, Growth, On-site data collections, Benthos, Outlets, Intakes, Water temperature, Chlorination, Slime, Crustaceans, Bioassay.
Identifiers: Great Britain.

Information regarding the behavior and response of benthonic and settling organisms in the intake and outfall area of a power station during one year beginning in October 1957, is presented. The results of experiments indicate that the outfall area was more favorable to growth than the intake. Although the light regime was the same, no vegetation was observed at the intake while there was a prolific growth of algae at the outfall. On the other hand, denser animal populations were found in the intake area. It seems likely that the initial stages of settling of Algae, Coelenterata, Crustacea, Mollusca and Polyzoa takes place when the power station stops operating and the water in the area is more or less still. Once established, several of the organisms remain. The general characteristics of the environment and the factors introduced by the station to the aquatic medium are discussed. (Jerome-Vanderbilt)
W74-02881

REVERSIBLE HEAT INJURY IN THE MARINE PSYCHROPHILIC BACTERIUM VIBRIO MARINUS MP-1,
Oregon State Univ., Corvallis. Dept. of Microbiology.
R. P. Griffiths, and R. D. Haight.
Canadian Journal of Microbiology, Vol 19, No 5, p 557-561, 1973. 6 fig, 11 ref.

Descriptors: *Marine bacteria, *Heat, *Mortality, *Metabolism, *Reproduction, Thermal pollution, Environmental effects, Biochemistry, Bacteria, Temperature, Toxicity, Inhabitors, Bioassays, Laboratory tests, Measurements, Evaluation, Analytical techniques, Water pollution effects.

A modification of the double-medium technique of Iandolo and Ordal (1966) was used to study heat injury in the obligately psychrophilic marine bacterium, Vibro marinus MP-1. Results using this technique demonstrated that heated cell suspensions contained a mixed population of uninjured, reversibly injured, and irreversibly injured (killed) cells. The age of the culture, temperature, and length of heating time influenced the ratio in the population of the various types of cells. The rapair process of reversibly injured cells was affected by the surface area-to-volume ratio of the medium used to support repair. (Jerome-Vanderbilt)
W74-02883

A STATEMENT PREPARED FOR SUBMISSION AT THE PUBLIC HEARING ON APPLICATION MADE BY BALTIMORE GAS AND ELECTRIC COMPANY FOR A PERMIT TO APPROPRIATE AND USE SURFACE WATER FOR OPERATION OF THE CALVERT CLIFFS NUCLEAR POWER PLANT MADE TO THE MARYLAND DEPARTMENT OF WATER RESOURCES,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
D. W. Pritchard.
Baltimore Gas and Electric Company Report, 1969, 54 p, 10 fig, 3 tab, 29 ref, 1 append.

Descriptors: Effluents, *Heated water, *Radioisotopes, *Chesapeake Bay, *Estuarine environment, Aquatic life, *Environmental effects, *Forecasting, Electric power production, Nuclear power plants, Thermal pollution, Distribution patters, Model studies, Simulation, Mixing, Tidal waters, Water quality, Water temperature, Statistics, Nuclear wastes, Radioactivity effects.

Based on the results of 20 years of studies and research, the Chesapeake Bay Institute at the request of the Maryland Department of Water Resources has prepared on evaluation of the possible effects of the use of Chesapeake Bay water for cooling a nuclear power plant. Heated discharge from the power plant is considered according to the following factors: the amount of heat rejected, the volume rate of flow of cooling water, the discharge structure design, the intake structure

esign, the physical movement and mixing of the idal water, the nontide circulation into the estua-y, and the rate of heat loss to the atmosphere. Results of computations depict the character of he thermal plume of discharged waters. Three ethods of determining the environmental ac-eptability of discharges are discussed. Thermal npact of an existing plant and of the proposed lant are compared. (Jerome-Vanderbilt)
/74-02886

FFECT ON ORGANISMS OF ENTRAINMENT N COOLING WATER: STEPS TOWARD PRE-ICTABILITY,
ak Ridge National Lab., Tenn.
. C. Coutant.
uclear Safety, Vol 12, No 6, p 600-607, Nov/Dec 971. 6 fig, 30 ref.

escriptors: *Water temperature, *Columbia iver, *Aquatic organisms, Chinook salmon, ethal limit, Thermal power plants, Heated water, ischarge (Water), Effluents, Temperature, quatic environment, Environmental effects, orecasting, Laboratory tests, Mortality, Toxici-, Thermal pollution, Mathematical models, tatistics, Fish, Predation, Pathology, Bioassay.

he direct and indirect effects of heat on organ-ms entrained from the Columbia River and some chniques used for predicting thermal shocks are scussed. Small drifting organisms which are awn with cooling water through the condensers a power plant are severely affected. The verage temperature rise of water passing through ich systems is 10.8 degrees C, but the tempera-re rise is seldom much less than 7.7 degrees C. In ases where a substantial portion of a stream flow, ke or estuary volume is diverted, there is a otential for serious ecological implications. The ossibility of direct mortality of entrained organ-ms due to thermal shock seems to be very real ring the warmer months, when the temperature crease from the condenser vauses a rise above e incipient lethal temperature for many species. predictive model based on the Columbia River ear Richland, Washington showed that the tem-erature of condenser cooling water would rise ove the lethal limit for Chinook Salmon between ly 1, and October 31. Exposure time or small antities of slime or corrosion control chemicals the water may also affect the mortality rate. ub-lethal effects are also discussed. These may clude loss of equilibrium or increased susceptibility to predation. (Jerome-Vanderbilt)
74-02894

FFECTS OF THERMAL ADDITIONS FROM HE YELLOWSTONE GEYSER BASINS ON HE BACTERIOLOGY OF THE FIREHOLE IVER,
diana Univ., Indianapolis. Dept. of Microbiolo-.
or primary bibliographic entry see Field 05B.
74-02895

ARIATION IN RESULTS OF IDENTICAL OASSAYS OF MINNOWS SUBJECTED TO STANT TEMPERATURE INCREASE,
nnessee Valley Authority, Chattanooga. Div. of nvironmental Research and Development.
L. Jensen.
ansactions of the American Fisheries Society, ol 101, No 3, p 402-407, July 1972. 2 tab, 2 ref.

escriptors: *Bioassays, *Minnows, *Water sposal, *Dilution, *Thermal pollution, Aquatic vironment, Aquatic animals, Heated water, En-ronmental effects, Mortality, Metabolism, ress, Fish behavior, Lethal dose, Temperature, valuation, Laboratory tests.

ariation in the results of five near-identical bioas-ys of fat head minnows subjected to instant increase in water temperature is examined. It is shown that median tolerance limits for an instant temperature increase can be estimated with precision, and levels of stress tolerable to more than 50% of the test fish can be estimated with somewhat lower precision. The standard deviation of the population tolerance frequency distribution can be of practical value in evaluating the effect of dilution on the lethality of wastes. TL 50 values should be used in calculations of safe levels of water quality alteration when bioassays and so called application factors are employed in regulating disposal of lethal agents. (Jerome-Vanderbilt)
W74-02898

EFFECTS OF TEMPERATURE ON GROWTH AND SURVIVAL OF LABORATORY REARED LARVAE OF THE SCALED SARDINE, HARENGULA PENSACOLAE GOODE AND BEAN,
Muskingum Coll., New Concord, Ohio. Dept. of Biology.
V. P. Sakena, C. Steinmetz, Jr., and E. D. Houde.
Transactions of the American Fisheries Society, Vol 101, No 4, p 691-695, 1972. 2 fig, 1 tab, 19 ref.

Descriptors: Fish, *Water temperature, *Thermal pollution, *Larval, *Growth rates, *Sardines, Aquatic environment, Heated water, Larval growth stage, Environmental effects, Sampling, Laboratory, Testing, Plankton, Bioassay, Bioindicators, Fish pathology.

Growth and survival of scaled sardine, Harengula pensacolae, larvae were evaluated in laboratory rearing experiments at temperatures ranging from 21 to 35C. Fertilized eggs were obtained in plankton collections made near Miami, Florida, in the summer, 1971. Larvae were reared for 15 days after hatching in temperature controlled, 75-liter aquaria. Hatching success was high at all temperatures but larvae did not survive at 35C, and survival was poor at 21 to 23C. Survival was best at temperatures between 26 and 32C. Mean daily growth increments ranged from 0.056 mm at 21 to 23C to 1.035 mm at 32C. Growth in relation to temperature was expressed by the equation $Y \pm -0.8474 + 0.0537X$, where Y equals daily growth increment and X equals temperature. Larvae behavior was normal at 26 to 33.5C. Critical high and low temperatures for larval survival were 35C and approximately 20C. (Jerome-Vanderbilt)
W74-02899

OBSERVATIONS ON THE REACTIONS OF YOUNG AMERICAN SHAD TO A HEATED EFFLUENT,
Essex Marine Lab., Conn.
B. C. Marcy, Jr., P. M. Jacobson, and R. L. Nankee.
Transactions of the American Fisheries Society, Vol 101, No 4, p 740-743, 1972. 1 fig, 2 tab, 8 ref.

Descriptors: Fish, *Shad, *Water temperature, *Thermal pollution, *Lethal limit, Aquatic environment, Effluents, Environmental, Fish behavior, On-site data collections, Migration, Migration patterns, Nuclear power plants.

Sampling of the Connecticut River has shown that young shad migrate downstream in August when water temperatures are the highest. The majority of the population is present in the vicinity of the Connecticut Yankee nuclear power plant when added heat from the plants effluent may influence their safe passage. The reactions of young shad to a heated effluent and attempts to define their upper temperature limits under conditions in the lower Connecticut River are presented. Observations of the upper lethal temperature and direct mortality were made by drifting young shad and blue-black herring in a floating live box through the heated effluent. Fish tested on September 23 had a lower mortality than those tested on October 14, probably due to a higher acclimation temperature. The upper natural temperature limit for young shad may be 30C. They avoid potentially lethal temperatures above 30C and are capable of transversing the heated effluent during their downstream migration. (Jerome-Vanderbilt)
W74-02900

THE EFFECT OF PHOTOPERIOD ON THERMAL RESISTANCE OF SPECKLED DACE,
Washington State Univ., Pullman. Dept. of Zoology.
E. E. Starkey, J. A. Kazmierski, M. R. Fletcher, and O. E. Maughan.
Transactions of the American Fisheries Society, Vol 101, No 4, p 715-718, 1972. 3 tab, 12 ref.

Descriptors: *Fish, *Water temperature, *Seasonal, *Biorhythms, *Adaptation, *Photoperiodism, Aquatic environment, Aquatic animals, Resistance, Thermal pollution, Laboratory tests, Bioassay, Bioindicators, Lethal limit, Pathology, Fish pathology.
Identifiers: *Stimulus response, Survival time.

Fish living in environments where the temperature of the water varies from season to season sometimes develop thermal resistance which varies adaptively. The importance of photoperiod as a stimulus to seasonal adaptation of thermal resistance in the speckled dace is examined. Specimens were captured, divided into two groups and placed in large aquaria. One group was exposed to daily photoperiods of 8 hours of light and 16 hours of dark, while the other was exposed to 16 hours of light and 8 hours of dark. After a 6 week acclimation period, fish from each tank were subjected to a range of temperatures in order to obtain some indication of survival times. Although the data do not statistically support the conclusion that seasonal photoperiod affects the temperature resistance of Phinichtys osculus, inconsistencies indicate the desirability of further work. The possible reversal of the expected photoperiodic effect, i.e., the short-day fish being more resistant to warm temperature that long-day fish, remains an enigma. (Jerome-Vanderbilt)
W74-02902

APPLICATION OF ALGAL BIOASSAYS IN EUTROPHICATION ANALYSES,
National Inst. for Water Research, Pretoria (South Africa).
D. F. Toerien, and D. J. Steyn.
South African Journal of Science, Vol 69, No 3, p 79-82, March 1973. 6 fig, 2 tab, 5 ref.

Descriptors: *Eutrophication, *Trophic level, *Bioassay, *Nutrients, *Analytical techniques, Water analysis, Water quality, Aquatic algae, Effluents, Aquatic productivity, Water pollution, Potable water, Waste water disposal, Stratification, Hypolimnion, Oligotrophy.
Identifiers: *South Africa, Batch culture assays, Continuous culture assays, Algal growth rate, Maximum cell concentration, Growth limiting nutrient, Algal growth potential.

The extent of the reduction of the water quality of several dams and rivers in South Africa by cultural eutrophication was studied by means of algal assays based on the assumption that there is a relationship between algal growth and the concentration of the nutrient in shortest supply. Comparison of the batch and continuous culture assay techniques, both of which provide a measure of the concentration of the growth-limiting nutrient, or trophic level, suggests that the former technique be used as a screening procedure and the latter as a more refined tool in eutrophication analyses. Batch assays were used to measure algal growth rates and maximum cell concentration values of 6 rivers and the variation downstream of the point at which one river received effluent from a sewage works. Algal growth potentials of 4 dams were determined, and variations at different sites

within one dam. Batch assay was also used to identify the growth-limiting nutrients of a dam by varying each plant nutrient in turn, and to predict the response of dam water to the addition of specific effluents or of high quality water. Continuous assay culture confirmed the findings of the batch assays. DWA)
W74-02907

ATMOSPHERIC REAERATION CAPACITY OF STREAMS. PART I. CRITICAL REVIEW OF METHODS AVAILABLE TO MEASURE AND TO CALCULATE THE ATMOSPHERIC REAERATION RATE CONSTANT,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Science.
J. S. Zogorski, and S. D. Faust.
Environmental Letters, Vol 4, No 1, p 35-59, 1973. 2 fig, 2 tab, 36 ref.

Descriptors: *Reaeration, *Atmosphere, *Oxygenation, *Streams, Mathematical models, Measurement, Analytical techniques, Equations, Dissolved oxygen, Forecasting.
Identifiers: *Reaeration rate constant, Reaeration capacity, Predictive models.

Current state of the art of predicting stream atmospheric reaeration rates under natural conditions is critically reviewed. Assumptions, degree of applicability, and general procedure of each model commonly used for aeration capacity prediction are presented. Methods directly measuring atmospheric reaeration include the disturbed equilibrium method, the gasometric method, and the technique of monitoring changes in dissolved oxygen concentrations between two sampling stations. Methods indirectly measuring atmospheric reaeration rate constant are the oxygen sag technique, the diurnal curve analysis, the tracer technique, and numerous empirical equations relating the reaeration rate constant to the stream's physical parameters. Selection of the proper method to measure or to predict the reaeration rate constant for a given situation depends primarily upon the physical characteristics of the river reach under the study. The primary basis of selection should be made on comparison with results obtained from direct measurement of the reaeration rates if possible. If not, then selection should be based on similarities between the physical characteristics of the study basin and those used in development of each predictive equation. Preference should be given to predictive equations either developed solely from field data or developed by laboratory experiments and later verified by field experiments. (See also W74-02917) (Jones-Wisconsin)
W74-02916

ATMOSPHERIC REAERATION CAPACITY OF STREAMS. PART II. DIRECT MEASUREMENT OF THE ATMOSPHERIC REAERATION RATE CONSTANT IN THE UPPER RARITAN RIVER BASIN,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Environmental Science.
J. S. Zogorski, and S. D. Faust.
Environmental Letters, Vol 4, No 1, p 61-85, 1973. 8 fig, 4 tab, 22 ref.

Descriptors: *Atmosphere, *Reaeration, *Measurement, *Streams, Rates, New Jersey, Mathematical studies, Channel morphology, Velocity, Width, Depth, Streamflow, Dissolved oxygen, Statistical methods, Equations.
Identifiers: *Reaeration rate constant, Raritan River (N.J.), Lamington River (N.J.).

The feasibility of using the disturbed equilibrium method, modified by Gameson and Truesdale (J. Inst. Water Eng 13: 175, 1959), in directly measuring the reaeration rate constant was determined and also which, if any, of the empirical predictive equations could be successfully applied in estimating reaeration rate constant. Two study sites, Raritan River and Lamington River, New Jersey, were selected based on channel uniformity and as being representative of the river. To create an oxygen deficit required for measurement, a catalyzed sodium sulfite solution was introduced. To evaluate various empirical equations, the mean velocity and mean depth during each experiment were determined. An additional criterion which must be satisfied when measuring reaeration rate constant values by the Gameson and Truesdale method is that complete horizontal and vertical mixing of the depleted water body must occur before the first sampling station is reached. These reaeration experiments indicate that this method, as modified by Gameson and Truesdale, can be successfully applied to measure the reaeration rate constant directly in small, shallow streams. The predictive equation of Owens, Edwards, and Gibbs (Int. J. Air Water Pollut. 8: 469, 1964), for shallow streams provided the best statistical fit to the reaeration rate constant values. The predictive equation for deep streams yielded the second best fit. (See also W74-02916) (Jones-Wisconsin)
W74-02917

STUDIES ON A SALINE LAKE ECOSYSTEM,
Monash Univ., Clayton (Australia). Dept. of Zoology.
K. F. Walker.
Australian Journal of Marine and Freshwater Research, Vol 24, No 1, p 21-71, 1973. 13 fig, 11 tab, 107 ref.

Descriptors: *Australia, *Biological communities, *Saline lakes, *Chemical properties, Geology, Meteorology, Vegetation, Sediments, Shoreline cover, Lake morphology, Temperature, Energy budget, Mathematical studies, Hydrology, Light, Light penetration, Ions, Hydrogen ion concentration, Conductivity, Nitrogen, Phosphorus, Phytoplankton, Succession, Photosynthesis, Productivity, Salinity, Zooplankton, Benthos, Rotifers, Evaporation, Rainfall, Anabaena, Solar radiation, Bacteria, Cyanophyta, Diptera, Dinoflagellates.
Identifiers: *Lake Werowrap (Victoria).

A detailed study of saline Lake Werowrap is reported. It is one of eight small crater lakes associated with a multiple scoria cone known as Red Rock, near Lake Corangamite, Victoria, Australia. Red Rock lakes have predominantly sodium 'chlorocarbonate' composition. Its tropic structure was taxonomically simple. Anabaena spiroides predominated in summer and autumn 1969, but subsequently was displaced by the dinoflagellate Gymnodinium aeruginosum and a blue-green alga tentatively identified as Chroococcus. Species composition change probably was due to progressive salinity increase. C-14 and oxygen productivity data showed good correspondence only in summer, due to effects of non-photosynthetic respiration. Changes in cell and pigment concentrations also were monitored. Radiation and temperature appeared the most influential factors governing primary productivity. Inorganic nitrogen was the only chemical constituent to show significant depletion. Considerable bacterial activity was indicated by high rates of 'dark' C-14 assimilation. Attention was given to the population dynamics of the rotifer Brachionus plicatilis, the dominant zooplankter, attaining peak densities in summer and autumn. Variations in rotifer population parameters were attributed mainly to salinity, temperature and food supply. Incomplete productivity data suggest that the lake had the most productive benthic community yet recorded. (Jones-Wisconsin)
W74-02920

PHYSIOLOGY AND ULTRASTRUCTURE OF AN OXYGEN-RESISTANT CHLORELLA MUTANT UNDER HETEROTROPHIC CONDITIONS,
Rice Univ., Houston, Tex. Dept. of Biology; and Rice Univ., Houston, Tex. Dept. of Environmental Science and Engineering.
W. M. Pulich, and C. H. Ward.
Plant Physiology, Vol 51, No 2, p 337-344, 1973. 8 fig, 1 tab, 24 ref.

Descriptors: *Plant physiology, *Plant morphology, *Oxygen, *Resistance, *Chlorella, Genetics, Respiration, Photosynthesis, Plant growth, Metabolism, Cultures, Phototropism, Algae.
Identifiers: *Biosynthesis, *Ultrastructure, *Heterotrophy, Chlorella sorokiniana.

Heterotrophic culture of the green algae, Chlorella, represents a useful experimental technique by which regulatory mechanisms can be investigated. Use of this technique to characterize a mutant strain of the high temperature species, C. sorokiniana, is reported. Heterotrophic culture conditions were optimized by testing various parameters, including temperature, gas conditions, and substrates for the proper combination promoting maximum logarithmic growth in the dark. Ultrastructural analysis revealed that osmiophilic deposits are present only in wild type, while the oxygen-resistant strain (ORS) apparently contains increased amounts of starch and endoplasmic reticulum. The ORS requires 6 to 8 days to adapt completely to dark, heterotrophic conditions, whereas the wild type acclimates in 1 day; the ORS is resistant to high oxygen tension only when grown on glucose, but not on acetate; the respiratory rate, but not the photosynthetic rate, of heterotrophic ORS is abnormal compared to the wild type. Electron micrographs of the wild type on air represent typical dark-grown C. sorokiniana. Organelles and fine structure common to Chlorellas and other eukaryotic cells are discernible. ORS on air present several outstanding differences with cells generally more variable in size and shape than the wild type. (Jones-Wisconsin)
W74-02922

POLLUTION OF THE 'EL CARPINCHO' POND (PAMPASIC REGION, ARGENTINA) AND ITS EFFECTS ON PLANKTON AND FISH COMMUNITIES,
La Plata Univ. (Argentina). Estacion Hidrobiologica y Acuario de Berisso.
L. Freyre.
Environmental Pollution, Vol 4, No 1, p 37-40, 1973. 4 tab, 2 ref.

Descriptors: *Water pollution effects, *Rehabilitation, *Plankton, *Fish, Biological communities, South America, Industrial wastes, Magnesium, Calcium, Sodium, Zooplankton, Catfishes, Sulfates, Nitrates, Phosphates, Iron, Lead, Silversides, Eutrophication.
Identifiers: *El Carpincho (Argentina), Pampasic Region (Argentina), Basilichthys bonariensis, Parapimelodus velenciennesi, Diversity index.

In the Southern Pampasic region of Argentina, sport fishing and other recreational activities have been developed in a large pond, the Argentine silver-side being the most favored fish species. Beginning with October 1969 pollution was caused by a milk processing plant, a plastic bag factory and an establishment for washing cattle trucks discharging liquid wastes without treatment into a creek directly connected to the pond. The biological effect on plankton was related to changes in Mg/Ca ratio. The reduced density of zooplankton produced a reduction in numbers of the freshwater Argentine silverside. The catfish, with the same trophic relations as the silverside, is a recent inhabitant of the pond with an explosive population increase; possibly this fish is in the last stage of exponential increase. The diversity index for the relative composition of the fish fauna rose from 0.3093 in 1966 to 1.9384 in 1970. It is proposed to empty the pond entirely by opening the dam to

emove the catfish and eliminate the excess lead nd iron. The rehabilitation of the biotope will then e carried out by refilling the basin. Later the sil-erside and other species can be reintroduced. Jones-Wisconsin)
W74-02923

ITROGEN FIXATION IN LAKE SEDIMENTS: A CONTRIBUTION TO NITROGEN BUDGET OF LAKE MENDOTA,
Visconsin Univ., Madison. Dept. of Soil Science.
. N. Macgregor, D. R. Keeney, and K. L. Chen.
Environmental Letters, Vol 4, No 1, p 21-26, 1973. tab, 14 ref.

Descriptors: *Nitrogen fixation, *Sediments, Lakes, Cycling nutrients, Wisconsin, Denitrification, Ammonia, Oxidation-reduction potential, Gas chromatography.
Identifiers: *Nitrogen budget, *Lake Mendota (Wis), Lake Wingra (Wis), Nitrogenase activity.

Sediments from Lake Mendota and Lake Wingra were examined for nitrogen fixation using the acetylene reduction assay. It has been commonly assumed that sediment nitrogen fixation is biological in origin and attributable to facultative or strictly anaerobic microorganisms of the genus Clostridium. All sediment samples produced between 1 and 2 nanomoles of ethylene per ml of sediment by the end of two days' incubation. Sediment from Lake Mendota incubated at 4C and 20C produced 70% and 114% respectively of the amount of ethylene formed at 10C. Methane formation, however, was significantly influenced by temperature, sediment incubated at 20C showing a 5-fold increase in methane formation over the same sediment incubated at 4C. The capacity of the sediments to reduce acetylene to ethylene appears to be biological and involves the enzyme complex known as nitrogenase. Acetylene reduction rates by lake sediments indicate 5 to 8% of estimated annual contributions of combined nitrogen in Lake Mendota may originate from nitrogen fixation in the top 10 cm of sediment profile. Concurrent denitrification and nitrogen fixation may account for maintenance of ammonium levels in some lake sediments. (Jones-Wisconsin)
W74-02924

THE EFFECT OF ETHYLENEDIAMINETETRAACETIC ACID ON THE GROWTH OF CHLORELLA PYRENOIDOSA AND ITS ROLE IN THE DYNAMICS OF METABOLISM AND ACCESSIBILITY OF IRON AND CALCIUM,
Instytut Zootechniki, Oswiecim (Poland). Samodzielna Pracownia Biologii Ryb i Strodowiska Wodnego.
Zarnowski.
Acta Hydrobiologica, Vol 14, No 4, p 353-373, 1972. 6 fig, 6 tab, 23 ref.

Descriptors: *Cultures, *Chlorella, *Plant growth, Metabolism, *Iron, Calcium, Dynamics, Chemical precipitation, Oxidation, Biomass, Chlorophyll, Algae, Trace elements.
Identifiers: *Ethylenediaminetetraacetic acid, Chlorella pyrenoidosa.

The influence of different components of the medium on the dissolved iron level and the course of hydroxy-reducing reaction of iron were investigated and the role of ethylenediaminetetraacetic acid in the process of iron stabilization, and optimum conditions of its application in the medium determined. Effects of iron concentration, of forms of iron, of the additions of calcium and Fe+EDTA, Ca+EDTA, and Fe+EDTA+Ca complexes on the growth intensity of Chlorella pyrenoidosa were studied. The level of iron, determined using the dipyridyl method, is lowered in the presence of mineral salts, phosphorus compounds being apparently responsible for the iron deficit. Biavalent iron was oxidized to trivalent iron. The level of dissolved iron is favorably affected by ethylenediaminetetraacetic acid. The most intense growth of alga cultures was obtained in the presence of iron chelated with ethylenediaminetetraacetic acid. In Chlorella culture, calcium added did not bring about any change in growth intensity. The pH values decreased with addition of EDTA depending on EDTA concentration. No great differences in growth intensity of Chlorella were found between the combinations with free EDTA and with the form of Fe+EDTA+microelements complex. (Jones-Wisconsin)
W74-02925

PLANKTON DYNAMICS IN A NEWFOUNDLAND LAKE,
Memorial Univ. of Newfoundland, St. John's. Dept. of Biology.
C. C. Davis.
Verhandlungen Internationale Vereinigung Limnologie, Vol 18, p 278-283, 1972. 3 fig, 7 ref.

Descriptors: *Plankton, *Dynamics, *Lakes, Nannoplankton, Phytoplankton, Zooplankton, Coliforms, Septic tanks, Cyanophyta, Copepods, Crustaceans, Daphnia, Diatoms, Ice cover, Anabaena, Chrysophyta, Rotifers, Protozoa.
Identifiers: *Newfoundland, *Hogan's Pond (Newfoundland), Diaptomus minutus, Daphnia catawba, Holopedium gibberum, Epischura nordenskioldi, Asterionella formosa, Tabellaria fenestrata, Uroglenopsis americana, Chrysosphaerella longispina, Sphaerocystis, Schroederia, Anabaena flos-aquae, Cyclops scutifer, Conochilus unicornis, Kellicottia longispina, Keratella cochlearis, Vorticella, Epistylis, Actinosphaerium, Dinobryon bavaricum.

To record plankton of the lakes of the little studied island of Newfoundland, samples were taken at 0, 2, 5, and 9 m every two weeks for 17 consecutive months at Hogan's Pond, about 15 km from St. John's (Avalon Peninsula). Hogan's Pond, relatively undisturbed by man, has no permanent inlets, water coming mainly from springs. There are 25 habitations around the shore, probably used as summer cottages. Coliform counts suggest there is very little direct pollution, but undoubtedly there has been substantial enrichment from septic tank seepage. The winter and spring phytoplankton was dominated by diatoms, Tabellaria fenestrata and Asterionella formosa being the most abundant. In June and July 1970, dominance of the phytoplankton by Tabellaria fenestrata was shared by Uroglenopsis americana, Chrysosphaerella longispina, Sphaerocystis, Schroederia, and Anabaena flos-aquae. In both autumns blue-green algae were dominant, with Microcystis aeruginosa being more abundant than Anabaena flos-aquae. In November and December 1969, the chrysophyte Dinobryon bavaricum attained dominant status, along with Tabellaria fenestrata. Plankton quantity in Hogan's Pond was low. Although it may be somewhat enriched compared to many other Newfoundland and boreal lakes, it can hardly be classified as eutrophic. (Jones-Wisconsin)
W74-02926

ASSOCIATED ORGANELLES IN THE BLUE-GREEN ALGA, ANACYSTIS NIDULANS,
Ohio State Univ., Columbus. Dept. of Microbiology.
W. C. Dierksheide, and R. M. Pfister.
Canadian Journal of Microbiology, Vol 19, No 1, p 149-157, 1973. 1 fig, 10 ref.

Descriptors: *Algae, *Cyanophyta, *Biochemistry, *Cytological studies, Plant morphology, Phosphates, Granules.
Identifiers: Organelles, Anacystis nidulans.

During observations of Anacystis nidulans, electron-dense polyphosphate granules were seen in close proximity to cyanophycin material. The cyanophycin granules are sometimes referred to as lamellasomes. It is believed that these granules act as a reserve for inorganic phosphate when nuclear synthesis has been interfered with. They appear as electron-dense bodies within the cytoplasm of the cell. Evidence is presented to show the association between polyphosphate granules and cyanophycin granules, and to suggest a functional relationship. In the electron microscope, longitudial sections of A. nidulans show, in addition to the layers of the cell wall and the plasma membrane, cell inclusions. Near the developing septum of the cell is a cyanophycin granule formed by series of concentric shells of membranes. Similar membranous structures can be seen surrounding polyphosphate granules. The formation of the polyphosphate granule in A. nidulans is envisioned to occur via the deposition of phosphate within the cyanophycin granule. The resulting porous body becomes electron-dense as phosphate deposition continues. The proximity of these inclusions strongly suggests that cyanophycin participates in the synthesis of polymeric phosphate. (Jones-Wisconsin)
W74-02927

EFFECT OF NITRITE AND NITRATE ON CHLOROPHYLL FLUORESCENCE IN GREEN ALGAE,
Florida State Univ., Tallahassee. Inst. of Molecular Biophysics.
E. Kessler, and W. G. Zumft.
Planta (Berl), Vol 111, No 1, p 41-46, 1973. 2 fig, 17 ref.

Descriptors: *Biochemistry, *Nitrites, *Photosynthesis, *Nitrates, *Fluorescence, Chlorophyta, Oxidation-reduction potential, Chlorella, Algae.
Identifiers: Ankistrodesmus braunii, Electron transport.

Photosynthetic reduction of nitrite was found in intact green algal cells and other organisms and observed in cell-free systems containing chloroplast fragments, ferredoxin, and nitrite reductase. Nitrate is not reduced photosynthetically in whole green algal cells in the absence of carbon dioxide. A light-dependent reduction of nitrate has been found in reconstituted systems with chloroplast fragments, FMN or ferredoxin, and nitrate reductase. Chlorophyll fluorescence is one of the most sensitive indicators for the redox state of the primary acceptor of photosystem II of photosynthesis. The influence of nitrite and nitrate on algal fluorescence was studied for more evidence concerning relation in vivo of nitrite and nitrate reduction to the photosynthetic electron transport system. Two forms of Chlorella vulgaris were used and compared with C. fusca and Ankistrodesmus braunii. In phosphate solution under an atmosphere of nitrogen, fluorescence shows a pronounced induction and rises to a high steady-state level. In the presence of nitrite, fluorescence decreases after a short induction peak to a much lower steady-state. Nitrate does not influence either induction or steady-state of fluorescence. Nitrite reduction in light is closely coupled to the photosynthetic electron transport system, whereas nitrate is not reduced photosynthetically in vivo. (Jones-Wisconsin)
W74-02928

THE APPEARANCE OF NITRATE REDUCTASE ACTIVITY IN NITROGEN-STARVED CELLS OF ANKISTRODESMUS BRAUNII,
University Coll. of Swansea (Wales). Dept. of Botany.
P. J. Syrett, and C. R. Hipkin.
Planta (Berl), Vol III, No 1, p 57-64, 1973. 4 fig, 2 tab, 12 ref.

Descriptors: *Cytological studies, *Nitrates, *Enzymes, *Nitrification, Nitrogen, Ammonia, Nitrites, Chlorella, Algae.
Identifiers: *Ankistrodesmus braunii.

The suggestion that nitrification occurs in cells of nitrogen-deficient algae is not substantiated. Neither does the formation of nitrate reductase by such algae appear to be a response to nitrate or chlorate present as impurities in the medium. In algae such as Chlorella and Ankistrodesmus synthesis of nitrate reductase is repressed by ammonium. When this repression is removed nitrate reductase is synthesized. The presence of nitrate or nitrite is not essential for this synthesis to occur although the rate of synthesis is stimulated when nitrate is added. This view is supported from the observations that Ankistrodesmus grown with nitrogen sources such as urea or glycine contains substantial quantities of nitrate reductase activity. Nitrate reductase activity was detectable in ammonium-grown cells of Ankistrodesmus braunii after 50 minutes of nitrogen starvation. The rate of formation of nitrate reductase was stimulated by addition of nitrate and inhibited completely by cycloheximide. Nitrogen-starved cells assimilated added nitrate or nitrite rapidly and no nitrite or nitrate was detectable in either cells or culture medium from cultures subject to nitrogen starvation. It is concluded that nitrate is not obligatory for the formation of nitrate reductase. (Jones-Wisconsin)
W74-02929

PRELIMINARY REPORT ON SIMULATED PASSAGE EFFECT OF POTENTIAL COLONIZING PROTOZOANS THROUGH CONDENSER OF A STEAM ELECTRIC POWER GENERATING PLANT UPON DOWNSTREAM PROTOZOAN COMMUNITY DEVELOPMENT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
E. D. Lorton, and J. Cairns, Jr.
Rev Biol (Lisb). Vol 7, No 3/4, p 215-227. 1970/1971. Illus.
Identifiers: *Colonizing protozoans, Density, *Electric power plants, *Protozoans, *Simulated passage, Steam condensers, Thermal pollution.

The purpose was to simulate the passage of water containing protozoans through the condensers of a steam electric power station in order to determine the effects upon colonization of downstream communities. Water was pumped from a reservoir unit (containing dechlorinated tap water, mud, plants, microorganisms, invertebrates, and fish) through a copper coil immersed in a hot water bath, to produce a 16-26C increase in temperature. The water then flowed into a cold water bath returning it to its original temperature. The water was then directed into 3 Plexiglas troughs 79 cm long, 5 cm wide, and 7.5 cm high, before it fell over an end plate 4 cm high back into the reservoir unit. Two control troughs were maintained in an identical manner except for the heat shock. The 5 communities were sampled weekly for 7 wk, and records of diversity (i.e. number of species) in each community and estimates of population density of 6 species were made. The experiment ran for 7 wk. No differences in diversity were observed between control and experimental communities. The results of the density studies were inconclusive probably because data were obtained for too few species.--Copyright 1973, Biological Abstracts, Inc.
W74-02930

THE OCCURRENCE OF HETEROTROPHIC BACTERIA IN THE WATERS OF THE ILAWA LAKES AND SOME OF THEIR PHYSIOLOGICAL AND BIOCHEMICAL PROPERTIES,
Wyzsza Szkola Rolnicza, Olsztyn-Kortowo (Poland).i. Instytut Inzynierii i Biotechnologii Zywnosci.
S. Niewolak.
Acta Hydrobiologica, Vol 14, No 4, p 331-351, 1972. 3 fig, 9 tab, 26 ref.

Descriptors: *Bacteria, *Lakes, *Plant physiology, *Biochemistry, Dairy industries, Pseudomonas, E. coli, Nitrogen, Carbon, Water pollution effects, Pigments, Systematics, Bioindicators.
Identifiers: *Heterotrophic bacteria, *Ilawa Lakes (Poland), Micrococcus candidus, Lake Jeziorak Maly (Poland), Lake Jeziorak (Poland), Micrococcus caseolyticus, Micrococcus freudenreichii, Pseudomonas aeruginosa, Pseudomonas syncyanea, Pseudomonas synxantha, Pseudomonas pavonacea, Bacillus.

On the basis of qualitative composition of bacteria in lake water, type of water body and kind of pollution may be determined. Changes of qualitative composition of heterotrophic bacteria of Ilawa Lakes. Poland and some physiological and biochemical properties were studied. Investigations were carried out on Jeziorak Maly (sewage reservoir) and Jeziorak (eutrophic lake) in the western Mazurian Lake District. Considerable variability was noted in seasonal occurrence of bacteria decomposing various nitrogen compounds in both lakes. The occurrence of bacteria decomposing various carbon compounds is often correlated with the seasonal factor. Of the genus Micrococcus, greater quantities occur in Lake Jeziorak Maly than in Lake Jeziorak. Among them are M. candidus, M. caseolyticus, M. freudenreichii, and others from dairy wastes. The occurrence of Pseudomonas aeruginosa, P. syncyanea, P synxantha, P. pavonacea, and Escherichia coli indicate the sewage character of this reservoir. Bacteria of the genus Bacillus (33-38%) dominate in Lake Jeziorak. Among the microorganisms isolated from Lake Jeziorak there were many strains of bacteria decomposing various forms of nitrogen and carbon and lesser numbers in Lake Jeziorak Maly. (Jones-Wisconsin)
W74-02931

EFFECT OF PH AND HIGH PHOSPHORUS CONCENTRATIONS ON GROWTH OF WATERHYACINTH,
Florida Univ., Fort Lauderdale. Agricultural Research Center.
W. T. Haller, and D. L. Sutton.
Hyacinth Control Journal, Vol 11, p 59-61, 1973. 3 tab, 17 ref.

Descriptors: *Nutrient removal, *Hydrogen ion concentration, *Phosphorus, *Water hyacinth, Plant morphology, Plant growth, Absorption.

In a study of nutrient removal by waterhyacinth, 1.0 ha of waterhyacinth was estimated to be capable of removing from water the annual nitrogen and phosphorus output of slightly over 800 people. The pH effects on productivity of waterhyacinths were evaluated, maximum amount of phosphorus absorbed measured, and distribution of the absorbed phosphorus in the plants determined. Waterhyacinth grew over a pH range of 4.0 to 10.0 which includes most natural bodies of water. Waterhyacinth growth determined by dry weight was higher when grown in a medium of 20 ppm phosphorus than when grown in 0, 5, 10, or 40 ppm concentration; concentrations higher than 40 ppm were toxic. Separation of plants into leaves, stems, and roots shows that weights of leaves and stems followed a pattern of growth similar to the whole plant. High phosphorus absorption, complemented with the high productivity of waterhyacinth, indicates waterhyacinth plants could be beneficial in removing large amounts of nutrients from etrophic waters by mechanical harvesting. Although cost of mechanically harvesting waterhyacinth is prohibitive, it would be worthwhile to know the value of removing nutreients from water and then including this value in determining the economic feasibility of the operation. (Jones-Wisconsin)
W74-02934

THE MOVEMENT AND IMPACT OF PESTICIDES USED FOR VECTOR CONTROL ON THE AQUATIC ENVIRONMENT IN THE NORTHEASTERN UNITED STATES,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05B.
W74-02948

WATER QUALITY CRITERIA FOR EUROPEAN FRESHWATER FISH. REOPRT ON AMMONIA AND INLAND FISHERIES.
Food and Agriculture Organization of the United Nations Rome (Italy). European Inland Fisheries Advisory Commission.

Water Research, Vol 7, No 7, p 1011-1022, July 1973. 2 fig, 2 tab, 51 ref.

Descriptors: *Water quality standards, *Ammonia, *Freshwater fish, *Toxicity, *Water temperature, *Hydrogen ion concentration, Water pollution sources, Water pollution effects, Sewage effluents, Industrial wastes, Farm wastes, Reviews, Resistance, Carbon dioxide, Dissolved oxygen, Hardness (Water), Alkalinity, Salinity, Rainbow trout, Minnows, Salmon, Brown trout, Eggs, Atlantic salmon, Perches, Carp, Sunfishes, Sticklebacks, Waterfleas.
Identifiers: Chronic tests, Chubs, Mosquitofish, Threshold concentrations, Roach, Rudd, Bream, Tench, Crucian carp.

The purpose of this review is to summarize the state of knowledge on the effect of ammonia on fish, to determine whether firm criteria can be established, and to indicate areas where further research is required. Data were primarily from European sources. The survey shows that sewage effluent and effluents from certain industries and from agriculture are common sources of ammonia in water. Of the parameters investigated (pH, CO2, DO, hardness, alkalinity, temperature, and salinity), it is found that the harmful effects of ammonia on fish were related to the pH value and the temperature of the water due to the fact that only the un-ionized fraction of ammonia is posonous. The un-ionized fraction increases with rising pH value, and with rising temperature. Fish differ slightly in their tolerance to ammonia depending on species. The difference in tolerance is more significant for short periods of exposure. The difference in tolerance is, however, not great enough to justify different criteria for different species. The lowest toxic concentration found for salmonids is 0.2 mg NH3/l (un-ionized), but other adverse effects caused by prolonged exposure are only absent at concentrations lower than 0.025 mg NH3/l (un-ionized). Concentrations of total ammonia which contain this amount of un-ionized ammonia vary from 19.6 mg/l (pH 7.0, 5 C) to 0.1 mg/l (pH 8.5, 30 C). The criterion should not be applied to temperatures below 5 C or to pH values above 8.5 when other factors have to be taken into consideration. (Little-Battelle)
W74-02951

ON THE SYSTEMATICS AND ECOLOGY OF THE GENUS CHAMESIPHON (CYANOPHYCEAE). 2. ECOLOGY (ZUR SYSTEMATIK UND OKOLOGIE DET GATTUNG CHAMESIPHON (CYANOPHYCEAE) 2. OKOLOGIE),
Biological Station, Lunz am See (Austria).
E. Kann.
Archiv fur Hydrobiologie, Suppl. 41 (Algological Studies 8), p 243-282, June 1973.

Descriptors: *Cyanophyta, *Aquatic algae, *Ecology, *Systematics, *Environmental effects, Speciation, Dominant organisms, Water quality, Aquatic habitats, Resistance, Ecological distribution, Aquatic plants, Water chemistry, Water temperature, Running waters.
Identifiers: *Chamaesiphon, Species abundance, Substrates, Chamaesiphon incrustans, Chamaesiphon confervicola, Chamaesiphon confervicola var. elongata, Chamaesiphon sub

globosus, Chamaesiphon rostafinskii, Chamaesiphon polonicus, Chamaesiphon geitleri, Chamaesiphon fuscus, Chamaesiphon oncobyrsoides, Chamaesiphon pseudopolymorphus, Chamaesiphon polymorphus, Chamaesiphon investiens var. roseus, Chamaesiphon niger, Chamaesiphon starmachii.

A compilation of the ecological factors governing the occurrence of the Chamaesiphon species investigated clearly reveals the environmental requirements of the abundant species, those of less frequently occurring species are accordingly more obscure. Chamaesiphon is a predominantly running water form, although some species grow exclusively on inanimate surfaces (stones, glass, plastics), while others grow only on living substrates (algae, aquatic plants). Few occur on both types. In general, the species have a wide temperature tolerance; only a few (Ch. geitleri, Ch. fuscus, Ch. rostafinskii) appear to prefer running water of constanlty low temperatures (i.e., also in summer). A similarly wide tolerance is displayed for the chemical quality of the water. With two exceptions, the Chamaesiphon species thrive equally well in calcium-rich water as in calcium-poor water, although some species are significantly more abundant in the former. It appears from previous investigations that Ch. fuscus is a Ca-poor water form and that Ch. geitleri perfers Ca-rich water. Only a small amount of data exists on the role played by the trophic level of the water body. The available data indicate that Chamaesiphon species grow best in unpolluted water, although some can tolerate polluted conditions. Ch. polymorphus is the only species which has been found growing in polysaprobic water. (Holoman-Battelle)
W74-02952

DESCRIPTION AND ECOLOGY OF THREE STENONEMA MAYFLY NYMPHS,
National Environmental Research Center, Cincinnati, Ohio. Analytical Quality Control Lab.
For primary bibliographic entry see Field 05A.
W74-02953

THE INFLUENCE OF EUTROPHIC LAKE SEDIMENTS ON THE GROWTH OF DIFFERENT PLANKTONIC ALGAE,
California Univ., Davis. Dept. of Zoology.
P. Javornicky, D. K. Fujita, and C. R. Goldman.
Archiv fur Hydrobiologie, Suppl. 41 (Algological Studies 8), p 341-362, June 1973. 7 fig, 4 tab, 41 ref.

Descriptors: *Nutrient requirements, Growth rates, *Diatoms, *Cyanophyta, *Chlorophyta, *Bioassay, Sediments, On-site tests, Phosphates, Iron, Nitrates, Essential nutrients, Calcium, Magnesium, Carbonates, Primary productivity, *Eutrophication, Dominant organisms, Silicates, *California, *Lake sediments.
Identifiers: *Clear Lake (CALIF), In vitro tests, In situ tests, Culture media.

In order to assess the effect of substances leached from sediments on the production of phytoplankton in a large, shallow, eutrophic lake (Clear Lake, California), one in situ experiment and four laboratory bioassays were conducted. The field experiment showed the effects of sediments on various species or groups of algae to differ: the presence of sediment inhibited the growth of Anabaena flos-aquae and A. circinalis while it stimulated the growth of Chlorococcales. In vitro bioassays were conducted with seven algal strains, Aphanizomenon flos-aquae, Microcystis aeruginosa, Oscillatoria limnetica, Nitzschia kuetzingiana, Navicula pelliculosa, Chlorella minutissima, and Scenedesmus intermedius, in 50-ml flasks containing sediment extract, a synthetic imitation of sediment extract, enriched (Ca, Mg, CO3, Si03) extract, or enriched imitation. Aphanizomenon and Chlorella grew well in the sediment and synthetic extracts for 200 hours which demonstrated that the cells were able to store required nutrients that were missing from the synthetic extract. This test also showed that the chelating effect of EDTA and citric acid used in the synthetic extract was similar to that of the humic substances in the sediment extract. The results with the enriched extracts led to the following conclusions: (1) Growth of Aphanizomenon is definitely limited by Fe and probably by P. (2) Growth of Microcystis and Oscillatoria is definitely limited by N and possibly by P. (3) Growth of Nitzschia is definitely limited by N and probably by P, Fe and Si. (4) Growth of Navicula is definitely limited by N and possibly by P. (5) Growth of Chlorella is definitely limited by N and Fe. (6) Growth of Scenedesmus is definitely limited by Fe, probably by N and possibly by P. Little-Battelle)
W74-02956

SULFUR AND THE TOXICITY OF THE RED ALGA CERAMIUM RUBRUM TO BACILLUS SUBTILIS,
New Hampshire Univ., Durham. Dept. of Biochemistry.
M. Ikawa, V. M. Thomas, Jr., L. J. Buclkey, and J. J. Uebel.
Journal of Phycology, Vol 9, No 3, p 302-304, September 1973. 2 tab, 9 ref.

Descriptors: *Rhodophyta, *Algal toxins, *Sulfur, *Inhabition, *Growth rates, Marine algae, Bacteria, Toxicity, Isolation, Sulfur compounds.
Identifiers: *Bacillus subtilis, *Ceramium rubrum, Sample preparation, Thin layer chromatography.

In an investigation of the antibiotic activity of algae, the red alga Ceramium rubrum showed the greatest growth inhibitory activity against B. subtilits. Quantities of C. rubrum were collected and assayed to determine the nature of the inhibitory substance. The algae were washed, blotted, and allowed to air dry at room temperature. The dried algae were ground, extracted with benzene for 4-5 days in a Soxhlet extractor, and dried in vacuo to yeild the crude active extract. The crude extract was dissolved in chloroform and chromatographed to yield an active fraction which was prepared for further identification by thin-layer chromatography. Crystalline sulfur was the inhibitory substance isolated from the red seaweed. This alga was unusual in that it contained a much higher free sulfur content than other red and brown algae tested. (Holoman-Battelle)
W74-02959

CELL YIELD AND GROWTH RATE IN ACTIVATED SLUDGE,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
J. H. Sherrard, and E. D. Schroeder.
Journal Water Pollution Control Federation, Vol 45, No 9, p 1889-1897, September 1973. 8 fig, 2 tab, 12 ref.

Descriptors: *Activated sludge, *Kinetics, *Growth rates, *Laboratory tests, *Biological treatment, Nutrient removal, Inorganic compounds, Efficiencies, Biochemical oxygen demand, Waste treatment, Nutrients, Cultures.
Identifiers: *Cell yield, *Sewage microorganisms, *Residence time, Substrate utilization, Mixed liquors, Continuous flow system, Data interpretation, Culturing techniques.

A laboratory study of the completely mixed ac tivated sludge process showed that the observed cell yield coefficient corresponding to each value of sludge age or mean cell residence time is a conceptually and practically significant parameter. At low cell residence times, low mixed liquor suspended solids, high sludge production, and high removal of inorganic nutrients may be expected, while long residence times lead to high mixed liquor suspended solids, low sludge production, and low inorganic nutrient removal. Removal of biochemical oxygen demand is nearly constant under both conditions. (Holoman-Battelle)
W74-02960

A PROCEDURE FOR SHORT-TERM BIOASSAY TESTS ON INDUSTRIAL EFFLUENTS OF LOW OXYGEN CONTENT,
Lakehead Univ., Thunder Bay (Ontario). Dept. of Biology.
G. Ozburn, J. Kraft, and L. Somppi.
Canadian Journal of Zoology, Vol 51, No 7, p 794-795, July 1973. 1 fig, 7 ref.

Descriptors: *Bioassay, Methodology, *Oxygenation, *Industrial wastes, *Oxygen sag, *Toxins, *Volatility, *Effluents, Toxicity, *Rainbow trout, Lethal limit, Dissolved oxygen, Laboratory tests, Water pollution effects, Pulp wastes.
Identifiers: Salmo gairdneri.

In a newly developed bioassay procedure concerned with the toxicity of industrial effluents with a low dissolved oxygen content, oxygenation was achieved using a pressurized oxygen supply and polyethylene bags. This method greatly reduces the possibility of stripping volatile toxins within the effluent. The decrease in toxicity that occurs if a sample is aerated with a bubbler before testing can be clearly shown with this method. The procedure has been used to determine the 96-hr LC sub 50 of a bleached kraft mill effluent for rainbow trout. (Holoman-Battelle)
W74-02961

SURVIVAL OF BACTERIA IN EXTREME ENVIRONMENTS,
Indiana Univ., Bloomington.
R. L. Weiss.
Available from University Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-2765. Ph D Dissertation, 1972. 235 p.

Descriptors: *Sulfur bacteria, *Thermophilic bacteria, *Cytological studies, *Hot springs, Acidic soils, Acidic water, Thermal springs, Organic compounds, Electron microscopy, Water temperature, Hydrogen ion concentration, Domonant organisms, Sulfur, Aquatic habitats, Isolation, Aquatic environment.
Identifiers: *Survival, *Sulfolobus acidocaldarius, *Characterization, Cell wall, Chemical composition, Bacterial physiology, Scanning electron microscopy, Fluorescent microscopy.

Sulfolobus acidocaldarius is a newly described species of sulfur oxidizing bacteria able to live at low pH and high temperature. The organism is also characterized by facultative autotrophic growth on sulfur or simple organic compounds and a subunit cell wall lacking peptidoglycan. In nature Sulfolobus was found to exist at temperatures from 60-94C and at pH values from 1.6-3. The temperature optimum for growth was 70-75C; whereas the pH optimum for C-14-glutamate uptake was from 2-4. Survival and growth of Sulfolobus in extreme conditions were demonstrated by slide immersion studies and electron microscopy of natural samples taken at pH 2-3 and 75C. These studies showed that in addition to Sulfolobus, two groups of rod shaped bacteria exist at 75C. These are distinguished from Sulfolobus by their morphology and cell wall structure. Electron microscopic studies showed that in flowing habitats with deposits of elemental S cells were enriched with thin filamentous appendages known as pili. These were not found on cells from bubbling pools containing S crystals, suggesting that the possession of filaments is a response to the physical flow of the habitat rather than the presence of S. The results of laboratory experiments suggest a role of filament in the attachment of cells to S. This attachment was observed directly by fluorescent and scanning electron microscopy. Additional studies were carried out on the cell envelope to determine the biochemical nature of the unusual cell

wall structure. These studies demonstrated a lipoprotein and a highly charged cell wall with a high proportion of hydrophobic amino acids. Conceivably such a structure could contricute to the survival of Sulfolobus in extremes of temperature and pH. (Holoman-Battelle)
W74-02962

EXPERIMENTAL ECOLOGICAL INVESTIGATIONS OF CHIRONOMUS THUMMI AND CHIRONOMUS PIGER (DIPTERA, CHIRONOMIDAE). (EXPERIMENTELL--OKOLOGISHE UNTERSUCHUNGEN AN CHIRONOMUS THUMMI UND CHIRONOMUS PIGER (DIPTERA, CHIRONOMIDAE),
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany). Dept of Tropical Ecology.
B. W. Scharf.
Archiv fur Hydrobiologie, Vol 72, No 2, p 225-244, July 1973. 10 fig, 4 tab, 28 ref.

Descriptors: *Diptera, *Cold resistance, *Dissolved oxygen, *Heat resistance, Growth rates, Water temperature, Growth stages, Water quality, Physiological ecology.
Identifiers: Chironomus piger, Chironomus thummi, Chironomus pulcher, Macroinvertebrates.

In the year 1956 the species Chironomus thummi was divided into two sub-species, which in 1972 were elevated to species: C. thummi and C. piger. In this work the ecological differences between the species in relation to temperature and oxygen pressures were investigated. Differences were found in the resistance to cold, and the duration of development at different temperatures and at various oxygen pressures. The larvae of C. piger are more resistant to cold than those of C. thummi which is in accord with what is known from natural conditions. The African C. pulcher is less resistant than C. thummi. No significant differences in the heat resistance and the preferred temperature of the two species could be found. At 10 and 15C the embryos of C. thummi develop more slowly than those of C. piger, but the development from egg to image occurs quicker in C. thummi. The observation that the larvae of C. thummi are more resistant to anaerobic conditions than those of C. piger can be confirmed by means of the rearing under diminished oxygen pressures. (Little-Battelle)
W74-02963

RED LIGHT AND NITROGEN STARVATION INDUCED CHANGES IN PIGMENT COMPOSITION (PHYCOERYTHRIN, CHLOROPHYLL FORMS) AND PHOTOSYNTHETIC 02 EVOLUTION OF PORPHYRIDIUM SP. (EFFETS DE LA LUMIERE ROUGE ET DE LA CARENCE EN AZOTE SUR LA COMPOSITION PIGMENTAIRE (PHYCOERYTHRINE, HOLOCHROMES CHLOROPHYLLIENS) ET L'EMISSION D'02 PHOTOSYNETHETIQUE DE PORPHYRIDIUM SP).,
Universite de Paris-Sud XI, Sceaux (France). Lab. of Plant Cellular Physiology.
E. Gverin-Dumartrait, J. C. Leclerc, and J. Hoarau.
Archive fur Hydrobiologie, Suppl 39 (Algological Studies 8), p 317-332, June 1973. 1 fig, 3 tab, 23 ref.

Descriptors: *Plant pigments, *Deficient elements, *Light quality, *Photosynthetic oxygen, Nitrogen, Rhodophyta, Chlorophyll, Cultures, Environmental effects, Photosynthesis, Aquatic algae, Limiting factors, Radiation.
Identifiers: *Porphyridium, Culture media, Chlorophyll a, Phycoerythrin, Absorption spectra, Phycocyanin, Culturing techniques, Oxygen evolution.

Porphyridium sp. Lewin/Bloom. 637, was grown at 8500 ergs/sq cm/s intensity in red light (654 nm) or in white light. It has been verified that algae cultivated in this white light, giving a large proportion of green and yellow radiations, show the same pigment composition and photosynthetic 02 evolution as algae cultivated in green light. Inoculum was either synchronized cells or cells previously deprived in nitrogen (effects of light being studied during the starvation removal). Nitrogen starvation includes a rapid dropping of the phycoerythrin/chlorophyll (Per/Chl) quantitative ratio caused by the fall of the Per content. Photosynthetic activities are reduced but remaining Per forms are still active for the energy transfer to Chl a. Refeeding gives a rapid increase of pigment contents, specially for the Per. When grown in red light, after previous starvation or not, Porphyridium cells show comparatively with white light cells a net lowerin of the Chl content without important changes in Per content (counter complementary chromatic adaptation). Absorption spectra of algae measured at -196C reveal three main forms of Chl a: Ca670, Ca677 and Ca683. In red light, the Ca683/Ca677 ratio is decreased while the Ca670/Ca677 is slightly increased. Measurements of photosynthetic 02 evolution indicate that in red light cells of low Chl content, efficiency of Chl for 664 nm radiations is increased. Efficiencies of Per and Chl for green (547 nm) radiations are little affected. (Holoman-Battelle)
W74-02964

THE EFFECT OF PH, C02-CONCENTRATION AND BACTERIA ON THE GROWTH OF THE BLUE-GREEN ALGA OSCILLATORIA REDEKEI VAN GOOR (EINFLUSS VON PH, C02-KONZENTRATION UND BAKTERIEN AUF DAS WACHSIUM DER BLAUALGE OSCILLATORIA REDEKEI VAN GOOR),
Max-Planck-Institut fuer Limnologie zu Ploen (West Germany).
M. E. Meffert.
Archiv fur Hydrobiologie, Vol 72, No 2, p 186-201, July 1973. 5 fig, 32 ref.

Descriptors: *Hydrogen ion concentration, *Carbon dioxide, *Photosynthesis, *Nutrient requirements, *Bioassay, *Growth rates, Cultures, Essential nutrients, Turbulence, Aeration, Bacteria, Resistance.
Identifiers: *Oscillatoria redeki, *Germany (Lake Edeberg), Autolysis.

Axenic and non-axenic suspensions of Oscillatoria redekei van Goor were cultivated to observe the effects of (1) deficiency of C02, (2) C02 at different pH values, and (3) bacteria. In axenic suspensions, decreases of C02 and Ph values above 10 caused extensive fragmentation and autolysis, most of the trichomes being destroyed. In non-axenic suspensions, fragmentation and autolysis were not so serious, so that the trichomes growth continued. At pH values between 7-10, growth of axenic cultures without fragmentation and autolysis was only possible in the range of pH 9. Trichomes of non-axenic suspensions showed a larger range of growth. Measurements from Lake Edeberg show that growth rate and trichome length (cells/trichome) correlate better with the free C02-concentration than with other parameters. The results suggest that O. redekei fixes C02 and not bicarbonate ion even though it can tolerate only low concentrations of free C02. Lakes rich in bicarbonate and carbonate are typical biotopes of blue-green algae since pH values are high and C02 levels are low. The disappearance of these algae may result from extensive turbulence which lowers pH and increases C02 in the epilimnion. Aeration of lakes to remove phosphorus therefore may have the secondary effect of eliminating blue-green algae. Since algae growth increase and autolysis was limited in the presence of bacteria under optimal conditions and athigh C02 levels, the 'C02-effect' of bacteria presented by Lange is not valid for O. redeki. (Little-Battelle)
W74-02965

UPTAKE OF FLOURIDE BY WATER HYACINTH, EICHHORNIA CRISSIPES,
Geological Survey of India, Hyderabad. Southern Regional Chemical Lab.
K. V. Rao, A. K. Khandekar, and D. Vaidyanadham.
Indian Journal of Experimental Biology, Vol 11, No 1, p 68-69, January 1973. 2 tab, 8 ref.

Descriptors: *Fluorides, *Water hyacinth, *Bioassay, Absorption, Calcium, Magnesium, Sodium, Potassium, Manganese, Iron, Cobalt, Nickel, Titanium, Copper, Lead, Zinc, Phosphorus, Heavy metals.
Identifiers: *Bioaccumulation, *Biological magnification, Removal, Biological samples.

Water hyacinths (Eichornia crassipes) which are known to act as scavengers, were collected from the Hussain Sagar tank in Hyderabad, India, and analyzed for fluoride and other trace elements (Ca, Mg, Na, K, Mn, Fe, Co, Ni, Ti, Cu, Pb, Zn, P) to evaluate the potential usefulness of this plant for removing fluorides from water. The fluoride concentration was 25 ppm in leaves and 60 ppm in petioles for a background concentration of 1 ppm in the tank. To further investigate water hyacinth as a fluoride scavenger, plants were exposed up to 26 days to concentrations of 0, 5, 10, 15, 20, and 25 ppm fluoride and analyzed for fluoride content. Uptake ranged from 11 to 75 mg in the course of 4 weeks. Since uptake was appreciable only at higher concentrations (greater than 10 ppm), water hyacinth is unsuitable for defluoridation since levels in natural waters are generally below this level. (Little-Battelle)
W74-02970

PATTERNS OF RADIOCARBON UPTAKE BY A THERMOPHILIC BLUE-GREEN ALGA UNDER VARYING CONDITIONS OF INCUBATION,
Queens Coll., Flushing, N.Y. Dept. of Biology.
J. A. Sperling, and M. H. Geraldine.
Limnology and Oceanography, Vol 18, No 4, p 658-662, July 1973. 2 fig, 1 tab, 4 ref.

Descriptors: *Bioassay, *Primary productivity, *On-site tests, *Cyanophyta, Photosynthesis, Radioactivity techniques, Model studies, Cultures.
Identifiers: *In vitro tests, Mastigocladus laminosus, *Thermophilic algae.

In vitro and fast (40 cm/sec), and slow (1/3 cm/sec) flow in situ methods of sampling were compared by measuring the primary productivity of Mastigocladus laminosus Cohn using each procedure. Current effect and the mechanics of in vitro incubation were distinguished by comparing the distributions of radioactivity within the cores. Thick (4.5-4.6 mm) and thin (10-1.5 mm) mats were grown on styrofoam in aquaria and transferred to a laboratory stream model for in situ tests. For in vitro tests, samples were taken with a steel cork borer, placed in 20-ml screwcap vials, and the vials placed in the stream model. C-14-labeled NaHC03 was introduced into the stream and samples taken for radioactivity counts after 3 and 9 hours. The data suggest that the in vitro technique for determining radiocarbon primary productivity of thermophilic algae that form gelatinous mats is justified, whether the cores by thick or thin, when the core is composed entirely of algae free from bacteria or substratum. Under these conditions the total uptake of in vitro incubations approaches that of in situ incubations. Where cores are bounded by bacteria or substratum, estimates of primary productivity may be underrated by the in vitro technique. (Little-Battelle)
W74-02972

EFFECTS OF DIELDRIN ON BROWN TROUT IN FIELD AND LABORATORY STUDIES,
Otago Univ., Dunedin (New Zealand).Medical School.
J. C. Dacre, and D. Scott.

New Zealand Journal of Marine and Freshwater Research, Vol 7, No 3, p 235-246, September 1973. 2 fig, 11 tab, 20 ref.

Descriptors: *Brown trout, *Water pollution effects, *Dieldrin, *Pesticide toxicity, *Benthic fauna, *Pesticide residues, On-site investigations, Laboratory tests, Bioassay, Lethal limit, Freshwater fish, Chlorinated hydrocarbon pesticides, Aquatic animals, Insecticides, Bottom sampling, Electro-fishing, Pollutant identification, Chemical analysis, Fishkill, Aquatic insects, Diptera, Water beetles, Invertebrates, Mayflies, Caddisflies, Midges, Crustaceans, Oligochaetes, Annelids.
Identifiers: Median tolerance limit, Animal tissues, Bioaccumulation, Salmo trutta, Muscle, Brain, Liver, Silver Stream, Gas liquid chromatography, Chironomids, Deleatidium spp, Riffle beetles, Black flies, Crane flies, Paracalliope, Pycnocentria evecta, Psilochorema bidens, Hydrobiosis umbripennis, Austrosimulium laticorne.

Fifty-five liters of dieldrin spray were accidentally discharged into the Silver Stream, a tributary of the Taieri River, Otago, New Zealand, in September 1963. All the brown trout (Salmo trutta) in the lower portion of the stream were killed. A quantitative survey was not carried out until January 1964, and some repopulation was noted. The bottom fauna was sampled 7 days after the release of dieldrin. Statistical analyses of the data showed no significant effect of dieldrin on the benthic fauna. Bioassays were conducted to determine the LC sub 50 for comparison with other species. Tissue analyses for dieldrin residues were also carried out by gas-liquid chromatography. The 24-hr LC sub 50 for dieldrin was 0.016 ppm. Minimum residue levels of dieldrin in skeletal muscles, liver, and brain were 1-2 ppm. (Holoman-Battelle)
W74-02979

PHYTONEUSTON ECOLOGY OF A TEMPERATE MARINE LAGOON,
American Univ., Beirut (Lebanon). Dept. of Biology.
J. T. Hardy.
Limnology and Oceanography, Vol 18, No 4, p 525-533, July 1973. 4 fig, 1 tab, 32 ref.

Descriptors: *Lagoons, *Temperate, *Ecology, Phytoplankton, *Bays, Dominant organisms, Primary productivity, Standing crops, Biological communities, Protozoa, Marine algae, Plankton, Water sampling, Water analysis, Surface waters, Water temperature, Sea water, Ecological distribution, Photosynthesis, Salinity, Wind velocity, Dinoflagellates, Diatoms, Chrysophyta, Pyrrophyta, Plant pigments, Biomass, Marine animals.
Identifiers: *Marine environment, *Phytoneuston, Sample preservation, Sample preparation, Species diversity, Species abundance, Silicoflagellates, Neuston, Chlorphyll a, Pheophytin, Cylindrotheca spp, Navicula directa, Pleurosigma spp, Gyrosigma spp, Thalassionema nitzschiodes, Chroomonas spp, Prorocentrum minimum, Navicula ostrearia, Amphiprora alata, Amphora turgida, Nitzschia longissima, Dityocha fibula, Mesodenium rubrum.

Comparison of neuston (upper 0.4 cm) and plankton (10 cm deep) water samples from a temperate marine lagoon and an adjacent, less sheltered bay indicates that: (1) the surface microlayer exhibits greater and more rapid environmental fluctuations than the subsurface water; (2) no abundant phytoneuston populations develop outside the lagoon; (3) in the main lagoon fairly abundant phytoneuston populations develop; (4) phytoneuston populations are most developed in the shallow sheltered pond area of the lagoon, particularly in summer; (5) taxonomic diversity is generally lower and dominance greater in well-developed phytoneuston populations than in underlying phytoplankton populations; (6) photosynthetic assimilation ratios are greater in phytoneuston than in phytoplankton populations. (Holoman-Battelle)
W74-02985

THE PRESENCE OF CLOSTRIDIUM BOTULINUM IN INDONESIAN WATERS,
National Atomic Energy Agency, Djakarta (Indonesia). Pasar Djumat Research Centre.
For primary bibliographic entry see Field 05A.
W74-02986

TOTAL DISSOLVED ELECTROLYTE EFFECTS ON PERIPHYTON,
Ottawa Univ. (Ontario).
M. Dickman.
Journal Water Pollution Control Federation, Vol 45, No 10, p 2211-2215, October 1973. 2 fig, 2 tab, 11 ref.

Descriptors: *Periphyton, *Electrolytes, *Dissolved solids, *Water pollution effects, *Liquid wastes, *Pulp wastes, Sessile algae, Water chemistry, Bioindicators, Monitoring, Protozoa, Salts, Aquatic algae, Water sampling, Industrial wastes, Effluents, Dominant organisms, Conductivity, Water temperature, Phenols, Chlorides, Nitrates, Phosphates, Turbidity, Suspended solids, Biochemical oxygen demand, Chlorophyta.
Identifiers: Data interpretation, Enumeration, Ottawa River, Sarcodina, Spirogyra, Ulothrix, Trachelomonas, Arcella vulgaris, Cochiliopodium, Cryptodifflugia, Difflugia, Difflugia constricta, Difflugia corona wallich, Difflugia oblonga, Euglypha, Heleospera, Hyalosphenia, Lesquereusia, Microcorycia, Pseudodifflugia, Sphenoderia, Clathrulina, Raphidiophyrs, Achnanthes, Achnanthes exigua, Achnanthes flexella, Achnanthes lanceolata, Achnanthes lapponica, Achnanthes suspecta, Amphora, Amphora normani.

Periphyton are good pollution indicators because they, unlike many fish and bottom fauna, cannot leave an area during severe pollution and return after conditions have improved. A study was made of the periphyton above and below a sulfite pulp and paper mill. Continuous conductivity monitoring supplemented the data collected on pH, temperature, alkalinity, oxygen, and turbidity. Results showed no significant differences in any of the water chemistry parameters above or below the pulp mill. The continuous monitoring, however, revealed peak values for conductivity below the mill that were not duplicated above the mill. The peaks indicated a change in one or more of the parameters that could not be found using random sampling techniques. (Holoman-Battelle)
W74-02990

AN INTRODUCTION TO THE PHYTOPLANKTON, PRIMARY PRODUCTION AND RELEVANT HYDROGRAPHY OF LOCH ETIVE,
University of Strathclyde, Glasgow (Scotland). Dept. of Applied Microbiology.
B. J. B. Wood, P. B. Tett, and A. Edwards.
Journal of Ecology, Vol 61, No 2, p 569-585, July 1973. 5 fig, 7 tab, 17 ref.

Descriptors: *Biomass, *Phytoplankton, *Primary productivity, *Carbon cycle, *Diatoms, Dominant organisms, Light intensity, Salinity, Pigments, Hydrography, Photosynthesis, Standing crops, Radioactivity techniques, Meteorology, Currents (Water), Sea water, Brackish water, Dinoflagellates.
Identifiers: Chlorophyll a, Pheophytin, *Scotland (Loch Etive), Sample preparation, Peridinium trochoideum, Peridinium (Heterocapsa) triquetra, Dinophysis, Prorocentrum micans, Gonyaulax, Skeletonema costatum, Coscinosira polychorda, Lauderia borealis, Chaetoceros, Rhizosolenia, Leptocylindrus danicus, Cerataulina pelagica, Asterionella formosa, Tabellaria, Thalassiosira.

Primary productivity was measured in Loch Etive for the purpose of estimating the contribution of phytoplankton to the carbon cycle. The meteorology and hydrography were also assessed. Phytoplankton as collected at various depths in plastic water bottles, filtered, pigment extracted, and chlorophyll and phaeophytin measured by fluorescence. Phytoplankton as identified and counted under the microscope. Primary production was measured by the C-14 method. The loch has a large catchment area, and inflowing freshwater reduces average salinity. Analysis of currents in terms of a two-layer system shows that separation of the deep (salty landwards flowing) and surface (brackish, seawards flowing) layers proceeds at 6-8 km/day. The upper 10 m of the water column corresponds approximately to the brackish and the euphotic zone. Standing crop in this zone of the lower loch ranged from about 7 to about 250 mg C/cu m based on pigment measurements. Skeletonema costatum was the dominant phytoplankter but small flagellates were also important. About 70 g C/sq m/yr is a rough estimate of gross annual primary production in the euphotic zone of the lower basin. A number of factors qualify this value, most important being difficulties in measuring CO2 concentrations, and day-to-day fluctuations in light intensity. Light is considered to be the most important limiting factor in the loch, and the effects of the wet west highland climate dominate the ecology of the phytoplankton. (Little-Battelle)
W74-02991

BOTTOM FAUNA CHANGES DURING ARTIFICIAL RESERVOIR DESTRATIFICATION,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Fisheries and Wildlife Sciences.
R. T. Lackey.
Water Research, Vol 7, No 9, p 1349-1356, September 1973. 1 fig, 5 tab, 27 ref.

Descriptors: *Benthic fauna, *Aquatic populations, *Aeration, *Destratification, Midges, Isopods, Amphipoda, Annelids, Diptera, Sampling, *Colorado.
Identifiers: *Parvin Lake (Colo), Macroinvertebrates.

Parvin Lake, Colorado, a 19 ha mesotrophic reservoir with maximum depth of 10 m and mean depth of 4.4 m, was studied to evaluate the effects of thermal destratification (aeration) on bottom fauna. Identical sampling programs were carried out during a control year (Nov 1968-Oct 1969) and a treatment year (Nov 1969-Oct 1970). Samples were collected with an Ekman dredge, sieved through a wash bucket and the organisms separated by sugar flotation and rose bengal dyeing. Sampling sites (4) were selected on the basis of previous studies, preliminary sampling, and depth. Four macrobenthic species were abundant during the study: Asellus intermedius (isopod), Chaoborus sp. (phantom midge), Hyalella azteca (amphipod), and Lumbriculus inconstans (annelid). Several species of Chironomidae were present and treated collectively. Hyalella significantly increased in abundance in shallow water during destratification. Chironomid larvae declined in abundance in the profundal zone during destratification in Winter and Summer. Asellus, Chaoborus, and Lumbriculus were not significantly altered in abundance during destratification. (Little-Battelle)
W74-02992

STATISTICAL ANALYSIS OF BIOLOGICAL DATA FROM PREOPERATIONAL-POSTOPERATIONAL INDUSTRIAL WATER QUALITY MONITORING,
Tennessee Valley Authority, Chattanooga. Div. of Environmental Research and Development.
For primary bibliographic entry see Field 05A.
W74-02993

EFFECT OF COPPER AND HEXAVALENT CHROMIUM ON THE SPECIFIC GROWTH RATE OF CILIATA ISOLATED FROM ACTIVATED-SLUDGE,
Tokyo Univ. (Japan). Inst. of Applied Microbiology.
R. Sudo, and S. Aiba.
Water Research, Vol 7, No 9, p 1301-1307, September 1973. 1 fig, 2 tab, 11 ref.

Descriptors: *Protozoa, *Bioassay, *Toxicity, *Copper, *Chromium, *Growth rates, Sewage bacteria, Cultures, Heavy metals, Resistance, Water pollution effects.
Identifiers: Vorticella microstoma, Colpidium campylum, Opercularia, Alcaligenes faecalis, Copper sulfate, Potassium dichromate.

Three species of protozoa, Vorticella microstoma, Colpidium campylum, and Opercularia sp., which commonly occur in activated sludge, were cultured in the presence of copper and hexavalent chromium to determine the effect of these metals on growth rates. Alcaligenes faecalis, which was found to be essentially unaffected by Cu and Cr, was added to mass and monoxenic cultures of protozoa as the sole food source. Metallic concentrations ranged from 0.05 to 1.6 mg Cu/l and 0.10 to 51.2 mg Cr/l which were added as copper sulfate and potassium dichromate. The term IL sub m (median inhibitory limit) was used to define the metal concentration required to reduce the specific growth rate of protozoa to one-half of that of a control. The IL sub m for copper was: 0.25 mg/l (V. microstoma), 0.32 mg/l (C. campylum), and 0.27 mg/l (Opercularia sp.). Regarding hexavalent chromium, IL sub m for V. microstoma, C. campylum, and Opercularia sp. were 0.53, 12.9 and 20.2 mg/l, respectively. Acclimation of each protozoa to these metals for 96 hr resulted in IL sub m enhanced values of 1.2-2.2 times as large as that for the control. (Little-Battelle)
W74-02994

A THEORETICAL STUDY OF FACTORS INFLUENCING THE MICROBIAL POPULATION DYNAMICS OF THE ACTIVATED-SLUDGE PROCESS - I. THE EFFECTS OF DIURNAL VARIATIONS OF SEWAGE AND CARNIVOROUS CILIATED PROTOZOA,
Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 05D.
W74-02996

INFLUENCE OF HUMIC SUBSTANCES ON THE GROWTH OF MARINE PHYTOPLANKTON: DIATOMS,
Bedford Inst., Dartmouth (Nova Scotia).
A. Prakash, M. A. Rashid, A. Jensen, and D. V. Subba Rao.
Limnology and Oceanography, Vol 18, No 4, p 516-524, July 1973. 7 fig, 3 tab, 27 ref.

Descriptors: *Humic acids, *Fulvic acids, *Diatoms, *Growth rates, *Water pollution effects, *Laboratory tests, Phaeophyta, Plant growth, Mangrove swamps, Marine algae, Kelps, Organic compounds, Organic acids, Phytoplankton, Chrysophyta, Decomposing organic matter, Primary productivity, Radioactivity techniques, Isolation, Separation techniques, Photosynthesis, Bioassay.
Identifiers: Cell volume, Chlorophyll a, Culture media, Sample preparation, Column chromatography, Fucus vesiculosus, Laminaria digitata, Skeletonema costatum, Thalassiosira nordenskioldii, Phaeodactylum tricornutum, Axenic cultures, Assimilation.

Humic compounds isolated from brownish water of a mangrove swamp and from Fucus vesiculosus and Laminaria digitata were studied in relation to their influence on the growth of axenic and nonaxenic marine diatom cultures. Growth was measured by estimation of cell numbers and volumes at frequent intervals in a Coulter counter equipped with a volume converter. Responses to humic additives were determined by exposing the cultures to 1 or 5 micro Ci of activity of C-14 added as C-14-Na2HCO3 and incubating them at 10 C and 4 klux light intensity for 2-4 hr. The activity was measured with a thin-window gas-flow counter. Chlorophyll a content was also measured. The humic and fulvic acids extracted from decomposed residues of the two littoral marine algae and from mangrove leachates, stimulated the growth of a number of marine diatoms. This stimulatory effect was dependent on the concentration as well as the molecular size of the humic additive. Low molecular size fractions at low concentrations generated the maximum growth responses, as evidenced by increased cell yield, growth rate, chlorophyll concentration, and radiocarbon assimilation. (Holoman-Battelle)
W74-02997

ENVIRONMENTAL CONTROL OF PHYTOPLANKTON CELL SIZE,
British Columbia Univ., Vancouver. Inst. of Oceanography.
T. R. Parsons, and M. Takahashi.
Limnology and Oceanography, Vol 18, No 4, p 511-515, July 1973. 1 fig, 3 tab, 18 ref.

Descriptors: *Phytoplankton, *Environmental effects, *Physiological ecology, *Plant growth, Growth rates, Limiting factors, Marine algae, Marine microorganisms, Light intensity, Mixolimnion, Tropical regions, Antarctic, Estuarine environment, Plant physiology, Nutrients, Ammonia, Nitrates, Upwelling, Dominant organisms.
Identifiers: *Cell size, Ditylum brightwellii, Coccolithus huxleyi, Coastal waters, Marine environment, Sinking rates.

On the basis of ecological and physiological data, those determinate factors contributing to phytoplankton cell size are the: (1) rate of nitrate or ammonia input to the cell, (2) extinction coefficient of the water, (3) mixed layer depth, (4) light intensity, (5) sinking rate of phytoplankton, and (6) upwelling velocity of the water. Two different sized species of phytoplankton, the large Ditylum brightwellii and the small Coccolithus huxleyi, were used to demonstrate this phenomenon mathematically. From the results obtained it was apparent that the growth rates for C. huxleyi are higher than those for D. brightwellii in areas which are known to be predominated by small-celled phytoplankton (e.g. stable subtropical seas such as the Sargasso Sea and temperate waters such as the subarctic Pacific). On the other hand the larger phytoplankton species shows a higher growth rate in areas of tropical and antarctic upwelling as well as in coastal environments; this also is in general agreement with current observations. (Holoman-Battelle)
W74-02998

HENNEGUYA SP. (SPOROZOA:MYXOSPORIDA) AS A PROBABLE CAUSE OF DEATH OF ESOX NIGER IN BROME LAKE, QUEBEC,
Noranda Research Centre, Pointe Claire (Quebec).
For primary bibliographic entry see Field 02H.
W74-03025

EFFECT OF HYDROLYSIS PLANT EFFLUENTS ON FISH (VLIYANNE NA RYB STOCHNYKH VOD GIDROLIZNOGO ZAVODA),
Meditsinskii Institut, Irkutsk (USSR).
G. A. Borodina.
Rybnoe Khozyaistvo, No 1, p 19-21, 1972. 2 tab.

Descriptors: *Fish, *Toxicity, *Industrial wastes, *Water pollution effects, *Chemical industry, Aquatic organisms, Biochemical oxygen demand, Waste dilution, Water pollution sources, Fish behavior, Fishkill, Fisheries, Reservoir fisheries, Waste water treatment, Organic compounds, Rivers.
Identifiers: USSR, Hydroloysis industry, Furfural, Iya River (USSR).

The Tulun hydrolysis factory in the USSR discharges untreated or only partially treated effluents into the Iya River which flows into the water reservoir of the Bratsk hydroelectric power plant. Since this reservoir also serves as a fish hatchery, the toxicity of hydrolysis factory wastes was investigated in laboratory studies. Young fish were placed in (1) undiluted untreated effluent (5-day BOD 2200 mg/liter, 14.5 mg/liter furfural content), (2) in partly purified undiluted effluent (722 mg BOD, 14.5 mg furfural/liter), and (3) in the same effluents after various degrees of dilution between 1:10 and 1:1000. In (1), all fish died within 3-4 min; in (2), they died within 20-25 min. They survived for 8 days in effluents diluted 1:500, a ratio at which the partly purified effluent seemed to exert no toxic effects. Only at 1000:1 dilution did the fish remain as healthy as in pure water for at least 10 days. The actual dilution of hydrolysis factory effluents at their river discharge point is 1:25 (Stapinski-IPC).
W74-03074

TOXICITY OF SODIUM SULFIDE TO COMMON SHINERS -- DYNAMIC BIOASSAY,
Institute of Paper Chemistry, Appleton, Wis. Div. of Industrial and Environmental Systems.
J. R. Chevalier.
Tappi, Vol 56, No 5, p 135-136, May 1973. 2 fig, 2 tab, 2 ref.

Descriptors: *Bioassay, *Toxicity, Pollutants, *Sulfides, Fish, *Shiners, *Toxins, Testing procedures, *Water pollution effects, Resistance, Pulp wastes, Sulfur compounds, Water quality control, Aqueous solutions, Water chemistry, Aquatic animals, Effluents, Industrial wastes.
Identifiers: *Sodium sulfide, Kraft mills.

Common shiners, Notropis cornutus (Mitchill), were exposed to sodium sulfide in concentrations of 0.33 to 3.95 ppm, using a dynamic bioassay procedure to assure continuous exposure and prevent oxygen depletion in the aquaria. The dilution water (purified by reverse osmosis and held chemically constant) and the test solution (mixed at 300 ppm sodium sulfide) were delivered separately by two mechanical proportioning pumps into 12 aquaria containing 5 different toxicant concentrations plus a control in two duplicate test series. Median tolerance limits (TL50) were calculated and found to be 2.68, 1.72, and 1.64 ppm for 24, 48, and 96 hr exposures. These values are only about one-half those found in static bioassays. The apparent decrease in TL50 may be partly attributable to the instability of sodium sulfide in solution. The true TL 50 values may be still lower than the dynamically measured values. The observed lability of sulfide emphasizes the need to consider the extent of conversion or removal of such toxicants by natural processes when setting ambient river quality standards. (Brown-IPC)
W74-03075

THE EFFECT OF PULP AND PAPER MILL EFFLUENTS ON TASTE AND ODOUR OF THE RECEIVING WATER AND THE FISH THEREIN,
Domtar Ltd. Research Centre, Senneville (Ontario).
For primary bibliographic entry see Field 05B.
W74-03085

BIOLOGICAL SURVEYS: INTENT METHODOLOGY, INTERPRETATION,
MacMillan Bloedel Ltd., Powell River (British Columbia). Powell River Div.
L. Melville.

Pulp and Paper Magazine of Canada, Vol 74, Convention issue, p 107-112 (Technical Paper T123-128), March 1973. 5 fig, 31 ref.

Descriptors: *Bioassay, *Pulp wastes, *Toxicity, *Waste water (Pollution), Aquatic life, *Water pollution effects, Monitoring, Water analysis, Analytical techniques, Plankton, Tidal waters, Sea water, Marine biology, Pulp and paper industry, Surveys.

Destruction of marine organisms is a well-known consequence of seawater pollution. The kind of organisms affected and the extent of destruction are a function of the type of discharged effluent and the state of the receiving water. Community structure of biological populations has been frequently to evaluate conditions of receiving waters. Guidelines that should be included in any biological survey are presented. Three methods which can be applied to the monitoring of a pulp and paper mill's receiving water are outlined and discussed, namely, intertidal, subtidal, and plankton analyses. (Brown-IPC)
W74-03086

RESPIRATION AND THERMAL TOLERANCE OF PHYLLOPOD CRUSTACEA TRIOPS LONGICAUDATUS AND THAMNOCEPHALUS PLATYURUS INHABITING DESERT EPHEMERAL PONDS,
California Univ., Riverside. Dept. of Biology.
For primary bibliographic entry see Field 02H.
W74-03090

INCIDENCE OF VIBRIO PARAHAEMOLYTICUS IN SHELLFISH FROM EIGHT CANADIAN ATLANTIC SAMPLING AREAS,
Department of National Health and Welfare, Ottawa (Ontario). Health Protection Branch.
For primary bibliographic entry see Field 05A.
W74-03185

STATE/LOCAL LAKE REHABILITATION PROGRAM: A PROPOSED BILL AND COMMENTARY,
Wisconsin Univ., Madison. Inland Lake Demonstration Project.
For primary bibliographic entry see Field 05G.
W74-03196

D. Waste Treatment Processes

CATALYTIC OXIDATION OF ORGANICS IN WASTEWATER,
Delaware Univ., Newark. Dept. of Chemical Engineering.
R. Katzer.
Available from the National Technical Information Service as PB-226 300 $4.50 in paper copy, $1.45 in microfiche. University of Delaware Water Resources Center Project Completion Report, 1973. 126 p, 32 fig, 10 tab, 88 ref, 2 append. OWRR A-014-DEL (5). 14-31-0001-3208,-3508-3808.

Descriptors: *Catalysts, *Phenols, *Oxidation, Evaluation, *Waste water treatment, *Kinetics, Aqueous solutions, Cost analysis, Chemical reactions, Industrial wastes, Economics, Inhibitors, Copper.
Identifiers: Free radical reaction, *Catalytic oxidation, Process design, Vaporphase oxidation, Aqueous-phase oxidation.

Catalytic oxidation of phenol in aqueous solution over copper oxide was studied in batchwise mode at 1-17 atm 02 pressure and 96-200C. The application of a catalyst markedly enhances the rate and significantly reduces the amount of intermediates formed over homogeneous oxidation. The reaction exhibits an induction period and a more-rapid steady-state activity regime. The rate is first order in both phenol and oxygen in the induction period but is one-half order in oxygen in the steady-state regime and shows variable dependence on catalyst concentration. The reaction occurs by a heterogeneous-homogeneous free-radical mechanism. The cost of removing 99% of the phenol from catalytic cracker (700 ppm) and coke plant (400 ppm) effluent by aqueous-phase catalytic oxidation was estimated to be $0.35 and $0.60 per 1000 gal. Aqueous-phase catalytic oxidation appears worthy of further serious consideration for wastewater treatment where high concentrations of organics are present. It appears uneconomical for low concentrations of organics in ambient temperature wastewater.
W74-02655

INDIVIDUAL HOME AEROBIC WASTEWATER TREATMENT SYSTEMS,
Colorado Univ., Boulder. Dept. of Civil and Environmental Engineering.
R. N. McBride.
Available from the National Technical Information Service as PB-226 478 $4.25 in paper copy, $1.45 in microfiche. M Sc Thesis, 1972. 116 p, 9 fig, 4 tab, 11 ref. OWRR A-021-COLO (2).

Descriptors: Water pollution control, *Sewage disposal, *Septic tanks, Data collections, Testing procedures, Evaluation, Domestic wastes, Rural areas, *Waste water treatment, Aerobic treatment, Biochemical oxygen demand.
Identifiers: *Aerobic sewage disposal units.

With the continuation of construction of new individual homes located beyond municipal sewer systems, more individual treatment systems will be installed. With the problem of failures of septic tank systems due to lack of maintenance, poor construction practices, and poor soil absorption, there will be more emphasis on better treatment systems. A system that has an economic advantage over septic tanks under certain soil conditions is the aerobic system. The use of aerobic systems is described including unit functions, types of units available, and problems and recommendations for improvement. Acrobic units under experimental conditions were observed to produce a better effluent than a septic tank. However, the performance as claimed by the manufacturers, could be misleading to homeowners. Results of tests run on the units located in the field, show that the units are meeting the manufacturers standards about 20% of the time. These units only average about a 44% reduction in BOD. This is assuming an incoming BOD of 250 mg/liter. In some cases the tests showed an influent BOD greater than this. (Woodard-USGS)
W74-02668

MULTIGOAL WATER QUALITY PLANNING MODEL,
Krannert Graduate School of Industrial Administration, Lafayette, Ind.
For primary bibliographic entry see Field 05B.
W74-02678

DESIGN OPTIMIZATION FOR BIOLOGICAL FILTER MODELS,
Northwestern Univ., Evanston, Ill. Technological Inst.
H. B. Gotaas, and W. S. Galler.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 99, No EE6, Proceedings paper No 10191, p 831-850, December 1973. 7 fig, 1 tab, 18 ref.

Descriptors: *Linear programming, *Costs, *Trickling filters, *Filters, *Biological treatment, *Design, Mathematical models, Sanitary engineering, Environmental engineering, Biochemical oxygen demand, Filtration, *Waste water treatment, Water pollution control, Systems analysis.

An optimization method utilizing linear programming has been applied to the Eckenfelder, Galler-Gotaas, NRC, and Upper Mississippi-Great Lakes Board models for filter design, to achieve the most economical design of biological sewage filters. The cost optimization procedure provides a more effective method for treating the different variables associated with biological filters. Filter depth has the greatest influence on the most economical design with the Galler-Gotaas model, some influence in the Eckenfelder and NRC models, and no influence in the Upper Mississippi and Great Lakes model. The most economical design is achieved when the depth is maximum to permit adequate filter ventilation, after which recirculation is economical up to about four recirculations. The radius of the filter must than be increased to provide greater volume to achieve the required BOD removal. Design curves are shown for the four models. Because more variables are included in the Galler-Gotaas model, it appears to provide the best fit to treatment observations for different types of wastes. If pumping to the filters is necessary regardless of the filter depth, deeper filters with forced ventilation are more economical than shallower filters. (Bell-Cornell)
W74-02679

COMPUTER SIMULATION FOR UPGRADING EXISTING WASTEWATER TREATMENT FACILITIES BY CHEMICAL PHYSICAL TREATMENT,
Envirotech Corp., Brisbane, Calif.
A. S. Anand, and W. C. Laughlin, Jr.
In: Proceedings of the Summer Computer Simulation Conference, Montreal, P.Q., Canada, July 17-19, 1973. 4 p, 3 ref.

Descriptors: *Computer programs, *Simulation analysis, *Water quality control, Waste water (Pollution), *Treatment facilities, *Sanitary engineering, Design criteria, Capital costs, Operating costs, Mathematical models, Systems analysis, Waste water treatment.
Identifiers: *Chemical physical treatment, Effluent polishing, Flowsheets, Timesharing.

Presented is a computer simulation program for polishing (upgrading) effluent from existing primary or primary-secondary treatment plants. The effluent may be treated, depending on waste characteristics and effluent quality, by three flowsheets: (A) The primary-secondary effluent is treated with alum or ferric chloride and polymers for removal of phosphorous and suspended solids (after which the wastewater is passed through granular media filters to capture suspended solids); (B) the effluent from 'A' is further treated with granular activated carbon in carbon columns to remove soluble organics; and (C) the effluent from an existing plant is treated with lime to remove phosphorous and suspended solids. The simulation program provides the user with complete flexibility to consider capital and operating costs, alternative flowsheets, design criteria and other parameters important for selecting a process for effluent polishing, while providing the power to analyze these parameters with a speed and an accuracy impossible to achieve by hand calculation. Timesharing is an important feature contributing to the program's flexibility. The program will do material and heat balance where applicable in the unit operation. (Bell-Cornell)
W74-02681

WASTE TREATMENT FOR SMALL FLOWS,
Advanced Waste Treatment Research Lab.
J. F. Kreissl.
Available from NTIS, Springfield, Va. 22151 PB-219 950, Price $3.00 printed copy; $1.45 microfiche. Paper presented at 1971 Annual Meeting of the American Society of Agricultural Engineers, Washington State University, Pullman, June 27-30, 1971. 24 p, 14 fig, 4 tab, 7 ref.

Descriptors: *Waste treatment, *Waste water treatment, Water pollution control, *Domestic wastes, *Municipal wastes, *Industrial wastes, Methodology, Reviews, Sewage disposal, Environmental control, Septic tanks.

The Environmental Protection Agency (EPA) is pursuing development of physical-chemical systems in order to be able to meet the needs of locations where biological treatment of waste is inadequate. The EPA program in the area of small systems or individual home wastewater treatment has thus far been concerned with the development of low-cost collection systems as well as the development of a state-of-the-art survey of flow reduction and wastewater treatment for individual homes. Projects in the near future are concerned with evaluation of household waste treatment systems and the development of model codes and reliability requirements for those systems. Attempts will be made on a continuous basis to utilize advances in processing and control techniques from larger systems for the development of improved methods for the treatment of household wastewaters. Various methods of municipal and industrial wastes treatment also are reviewed. (Woodard-USGS)
W74-02723

CONSERVATION OF WATER RESOURCES AND THEIR RATIONAL USE IN THE NATIONAL ECONOMY (OKHRANA VODNYKH RESURSOV I IKH RATSIONAL'NOYE ISPOL'ZOVANIYE V NARODNOM KHOZYAYSTVE),
O. Z. Revera, and O. P. Sinev.
Gidrotekhnika i Melioratsiya, No 5, p 119-122, May 1973.

Descriptors: *Conferences, Water resources, *Water conservation, *Water utilization, Water supply, Water pollution, *Water treatment, *Waste water treatment, Water quality, Water quality control, Water pollution control.
Identifiers: *USSR (Ukraine).

An All-Union scientific and technical conference on protection of water resources from pollution and on their rational use in the national economy was held at Rovno in the western Ukraine, October 16-18, 1972. The conference was under the sponsorship of the Ministries of Higher and Secondary Specialized Education of the USSR and Ukrainian SSR, and the Ukrainian Institute of Water Management Engineers. Conference participants included 215 representatives from 38 educational establishments and 43 scientific-research, planning, and industrial organizations. A total of 79 papers and reports were presented. The work of the conference was divided into 3 sections: water resources, water quality, and water quality control; techniques of wastewater treatment and utilization; and water supply and modern methods of water treatment. Summaries are given of a number of papers, and general goals and research recommendations of the conference are outlined. (Josefson-USGS)
W74-02749

POLLUTION ABATEMENT PROJECT, BANDELIER NATIONAL MONUMENT, NEW MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT).
National Park Service, Santa Fe, N. Mex.

Available from National Technical Information Service as EIS-NM-73-0459-F. $4.00 in paper copy. March 14, 1973. 39 p, 3 map.

Descriptors: *New Mexico, *Sewage disposal, *Sewage lagoons, *Rio Grande River, Dikes, Environmental effects, Treatments, Cess pools, Sewage treatment, Sewage lagoons, National monuments, *Waste water treatment, Pollution abatement.
Identifiers: *Environmental Impact Statements, Sandoval and Los Alamos Counties (N.M.), Sewage lift station.

The rehabilitation of the existing sewage disposal system at Bandelier National Monument, New Mexico, to eliminate contamination of the Rio Grande River and to include a lift station and two sealed sewage lagoons. The major environmental impact of this project will be beneficial, in that it will enhance both the natural and social environment of the monument. Minor and reversible adverse impacts will affect vegetation at localized sites. Four alternatives to the proposed project had been considered. The existing sewerage system consists of three septic tanks with leaching fields, an open spray field, and two sewage lagoons. The proposed sewerage systems will pick up raw sewage from the monument area. Effluent will be pumped to two evaporative lagoons. These lagoons will eliminate the leach fields and the spray field. The lagoons will be constructed of rock and earth dikes. Much of the environmental impact will be temporary in nature and will be eliminated by natural growth in a few years. Mitigating measures included in the proposed project are listed. (Sears-Florida)
W74-02801

FACTORS CONTROLLING SLUDGE DENSITY DURING ACID MINE DRAINAGE NEUTRALIZATION,
Ohio State Univ., Columbus. Dept. of Chemical Engineering.
K. Svanks, and K. S. Shumate.
Available from the National Technical Information Service as PB-226 615 $4.75 in paper copy, $1.45 in microfiche. Ohio State University Water Resources Center Project Completion Report, October 1973. 156 p, 36 ref, 11 tab, 93 ref. OWRR A-022-OHIO (1), 14-31-0001-3235.

Descriptors: *Mine Drainage, *Neutralization, *Lime, *Calcium Carbonate, *Sludge, *Density, *Recirculation, Crystallization, Catalysts, Oxygenation, Rates, Biological Oxidation, Aluminum.
Identifiers: Acid ferrous iron solution, Synthetic Acid Mine drainage, High density sludge, Magnetite, Geothite, Lepodocrocite, Catalytic oxygenation, Bacterial catalysis, Thiobacillus-Ferrobacillus, Interference.

Laboratory scale experiments were employed to investigate the feasibility of coal mine drainage neutralization treatment with the formation of magnetite and other high density/low volume sludges. Where applicable, the effects of bacterial catalysis on ferrous iron oxidation were incorporated into the investigations. Major process types studied included, magnetite formation, and high density sludge from lime (Ca (OH)2) treatment of acid mine drainage. Both acidic iron solutions and synthetic acid mine drainage were studied, primarily in batch process reaction systems, both with and without sludge observed, and interpretations draw heavily on both experimental results and an incisive literature review. Results indicate that magnetite formation, while readily accomplished, is impractical due to aluminum interference and adverse temperature effects. High density sludges of up to 30% solids, obtained in this work and reported but not explained in other literature, are associated with the fomation of crystalline goethite (Alpha Fe00H) and lepiodocrocite (gama Fe00H), enhanced by precipitation at low pH, by sludge recirculation, and by controlled ferrous oxidation rates. Bacterial catalysis is ineffective in the process optimum pH range, and CaCO3 or split CaCO3-Ca (OH)2 treatment offers fundamental advantages over Ca (OH)2 treatment. Overall project results provide a more rational basis for treatment process development and design than is currently available, and identify several promising avenuse for further process performance improvement.
W74-02827

REGIONAL WASTEWATER DEVELOPMENT PLAN, WATER QUALITY PLANNING.
Alamo Area Council of Governments, San Antonio, Tex.

1970. 38 P, 35 FIG.

Descriptors: *Planning, *Sewerage, *Waste water treatment, *Texas, Water quality control, Regional development, Management, Computer models, Urbanization, Projections.
Identifiers: *San Antonio (Tex), *Water quality management, Edwards Aquifer (Texas), San Antonio River (Tex.), Cibolo Creek (Tex.).

Results of an intensive two-year study of wastewater management in metropolitan San Antonio, Texas planning region are presented. This area has very limited surface water resources and draws its entire water supply from the Edwards Aquifer. Water removed from the aquifer is returned to the streams if it is not consumed. Water demands for the region double almost every 30 years with resultant decline in the well surface. The small local streams are increasingly becoming unable to handle the region's wastewater, and oxygen depletion during the summer is a special problem. Existing collection and treatment systems, future wastewater loads, and planning for new wastewater management systems are described. Included in the planning methodology is a computerized design model to quickly determine construction costs of alternative systems. The basic conclusion of the study is that the best approach is the use of regional sewerage systems rather than several smaller ones because of their economy and ability to meet higher levels of wastewater treatment. The two key agencies required to implement the regional system approach are the City of San Antonio and the San Antonio River Authority which have been designated by the Texas Water Quality Board to handle water quality management in the region. (Elfers-North Carolina)
W74-02830

SEWERAGE FACILITIES PLAN, IN ACCORDANCE WITH THE PENNSYLVANIA SEWERAGE ACT (537).
Delaware County Planning Commission, Media, Pa.

1971. 37 P, 9 MAPS, 6 TAB, 3 APPEND.

Descriptors: *Sewage, *Regional planning, Coordination, *Pennsylvania, *Planning, Urbanization, Septic tanks, Soils, Administration, Waste water disposal, *Waste water treatment, *Treatment facilities.
Identifiers: Delaware County (Pa.), Schuylkil River, Brandywine Creed, Sewerage facilities expansion.

The Pennsylvania Sewerage Facilities Ace (537) requires all cities to prepare plans for sewerage facilities 10 years into the future, and for areas not served by public sewers to determine the assimilative capacity of the soils and regulate development accordingly to prevent creation of health hazards. Groups of cities may join to prepare plans. The Delaware River Basin Commission and the Delaware Valley Regional Planning Commission urge development of plans for regionalization of public sewer systems wherever feasible. Growth and development have been strongly influenced by patterns of highway and transit facilities with intense development occurring radially out from Philadelphia and at relatively scattered locations. Watershed areas of major streams were not recognized as the potential service areas for orderly provision of sanitary sewer services. New towns provided treatment plants as needed rather than expanding existing plants closer to the Delaware River and extending interceptors through areas of lower intensity development. Delaware County characteristics, existing sewerage system, population and future growth, and the regional sewerage plan are discussed. The regional system plan is di-

vided into 6 basic watersheds, the Schuylkil River, Chester Creek, Danby Creek, Crum Creek, Ridley Creek, Brandywine Creek, and unsewered areas with requirements and projects detailed for each. Recommendations include the formulation of more detailed plans by each city consistent with this general plan, adoption of septic tank ordinances, continual modification of the county plan as development patterns change, and expansion or phasing out of specific facilities throughout the county. Large detailed maps supplement the text. (Elfers - North Carolina)
W74-02832

COMPREHENSIVE WATER AND SEWER STUDY, HAMILTON, WALKER, AND CATOOSA COUNTIES, (BOOK TWO).
Hensley-Schmidt, Inc., Chattanooga, Tenn.

Prepared for Chattanooga Area Regional Council of Governments, Tennessee. December, 1971. 256 p, 39 fig, 9 tab, 1 append. Tennessee P-131.

Descriptors: *Water supply, *Sewerage, *Comprehensive planning, *Tennessee, *Tennessee River, Regional analysis, *Georgia.
Identifiers: *Regionalization, Chattanooga, Hamilton County (Tenn.), Catoosa County (Ga.), Walker County (Ga.), Nickajack Lake (Tenn.), Chickamauga Lake (Tenn.).

There are 21 water supply systems in the 3-county region. Existing facilities and service areas are described for each water system, followed by current plans affecting each system and recommendations for a 5 to 10 year period. A 20-year plan for water supply based on regionalization calls for interconnection of the systems and using the largest and safest sources of water in the three-county area, thus ensuring adequate water supply at least cost. The main stream of the Tennessee River and Crystal Springs and West Chickamauga Creek in Chickamauga, Ga., are the water sources of greatest reliability. A regional water plan, including construction of a 3-county loop should be adopted to increase production facilities. Existing water supply and purification facilities should be upgraded, especially in rural utility systems. Twelve public and 52 private sewerage systems are analyzed similarly to the water systems. Three comprehensive regional sewerage plans are presented for a 20-year horizon, one of which is recommendation. This plan reduces the number of wastewater treatment plants to 5. Four plants would discharge into Chickamauga Lake and Nickajack Lake. One would discharge into Chattooga Creek in south Walker County. Operational costs appear feasible with a minimum of conflict between stream use and demand. Periodic updating of sewerage plans plus a regional wastewater collection and treatment service to upgrade degree of treatment and assume development of adequate wastewater facilities, maintenance and operation is recommended. (Stein - North Carolina)
W74-02833

EVALUATION OF ALTERNATES FOR WATER POLLUTION CONTROL AND RESOURCE MANAGEMENT: PHASE III, POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY, ANNEX C.
Boyle Engineering, Las Vegas, Nev.; and Cornell, Howland, Hayes and Merryfield, Las Vegas, Nev.

Prepared for the Las Vegas Valley Water District, November, 1972. 80 p, 10 fig, 7 tab, 9 append.

Descriptors: *Planning, *Waste water disposal, *Water pollution control, *Nevada, Evaporation, Treatment facilities, Water reuse, Alternative costs, *Waste water treatment.
Identifiers: Las Vegas Valley District (Nev.), *Las Vegas Wash and Bay (Nev.), Dry Lake (Nev.).

The alternative solutions investigated were: groundwater recharge, complete treatment, Colorado River return, export to Dry Lake, export to Eldorado Valley, and export to Jean Lake. Since the magnitude of problems connected with wastewater disposal and water resource development depend largely on population, all alternatives were studied for both high and low population growth ranges (1,000,000 and 800,000 permanent residents by the year 2000, respectively). The first three alternatives had been fully analyzed in the Phase II Studies, and were reevaluated only on the basis of different population and water budgets. The export systems are a combination of similar facilities that provide for export of wastewater in early year; utilize invalley uses to the maximum practical extent; and desalt wastewater to augment the potable supply when the groundwater and Colorado River resources are at capacity. The parameters used to evaluate the alternatives were: technical feasibility in 1974; meets federal and state standards; provides pollution abatement; protection of water resource; augmentation of water resource; enhancement of water quality; potential for agriculture outside Las Vegas Valley: environmental interference; environmental enchancement; interference with planned development; initial costs; staged costs; operating costs; unit costs; ability to accomodate non-potable beneficial uses; and potential for power for cooling water. Recommended was the Dry Lake Export alternative, with a provision for recovery of wastewater to supplement future potable needs. (Hoffman - North Carolina)
W74-02834

PUBLIC POLICY ALTERNATIVES AFFECTING WATER AND SEWER SERVICE IN URBAN GROWTH AREAS.,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 03D.
W74-02835

NORTH CAROLINA WATER PLAN PROGRESS REPORT: CHAPTER 19: POWER AND WATER.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 03D.
W74-02836

COMPREHENSIVE REGIONAL WATER AND SEWER SYSTEMS INVENTORY AND ANALYSIS,
Alabama-Tombigbee Rivers Regional Planning and Development Commission, Camden.
For primary bibliographic entry see Field 06B.
W74-02837

HILLSBOROUGH COUNTY, FLORIDA: POPULATION PROJECTIONS AND ENVIRONMENTAL FACTORS.
Hillsborough County Planning Commission, Tampa, Fla.
For primary bibliographic entry see Field 06D.
W74-02838

SOLIDS WASTE DISPOSAL.
Montgomery County Sanitary Dept., Dayton, Ohio.

February, 1973. 60 p, 4 maps, 7 tab, 21 ref.

Descriptors: *Water supply, *Groundwater recharge, *Sludge disposal, *Ohio planning, Water resources, Environmental effects, Waste water treatment, Recreation, Parks, Levees, Land reclamation.
Identifiers: Montgomery County (Ohio), Great Miami River (Ohio).

Four basic problems related to water resources and the environment involve the provision of water supplies, advanced waste water treatment, sludge disposal, and the provision of recreation facilities. A tentative solution to these problems in Montgomery County is presented. A regional waste water treatment plant is proposed in the southern part of the county on the Great Miami River. The ultimate capacity of the plant would be 100 mdg by 2020. In the meantime land acquired for expansion would be used for recreation. In addition, other large tracts of land would be purchased with 75% federal funding for sludge disposal and eventually converted to open space and recreational land. A large lagoon would be constructed to hold treated effluent and discharge it according to the flow of the River. The effluent could also be used for industrial water supply. Finally, nearby gravel pits would be used for groundwater recharge and the levees along the river would be developed for hiking and bikeways. (Elfers - North Carolina)
W74-02840

WATER QUALITY MANAGEMENT PLAN FOR THE GREEN AND CEDAR RIVER BASINS IN THE STATE OF WASHINGTON: PROGRESS REPORT FOR FISCAL YEAR ENDING JUNE 30, 1972.
Stevens, Thompson and Runyan, Inc., Portland, Oreg.

Prepared for Municipality of Metropolitan Seattle, River Basin Coordinating Committee. June, 1972. 44 p, 17 fig, 2 append. IGA-00037.

Descriptors: *River basin development, *River basin commissions, *Washington, Oregon, River basins, Planning, Watershed management, Pollution abatement, Water pollution control.
Identifiers: *Seattle (Wash.), Cedar River (Wash.), Green River (Wash).

King County and the municipality of Metropolitan Seattle (METRO), in response to state legislation, named the River Basin Coordinating Committee (RIBCO) to develop water pollution abatement and water resource management plans for the Cedar and Green River Basins south of Seattle. This progress report explains the overall plan for an integrated River Basin Program covering water pollution control and abatement, water resource management, land use allocation, urban runoff and basin drainage, solid waste management, and air pollution control and abatement, linked by a system evaluation model. Only the first three program elements have been funded. Work accomplished in fiscal year 1972 has included setting of goals and objectives for the total River Basin Program, development of a management structure for the program, development of a contingency plan for the environmental management information system, and data collection for the water pollution control and abatement plan. Expenditures for the fiscal year and budgets for 1973 and 1974 and progress to date on the total plan are explained. Charts show in very general terms the intended tasks to be accomplished during a three-year period. Goals, objectives, and policies for the River Basin Program are set forth in an appendix. (Stein - North Carolina)
W74-02842

PLANNING FOR WATER RESUE,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
D. A. Okun.
Journal of the American Water Works Association, Vol 65, No 10, p 617-622, October, 1973. 5 fig, 49 ref.

Descriptors: *Water reuse, *Waste water treatment, Water quality, Water quality control, Water supply, Potable water, Water pollution.
Identifiers: *Dual water systems, Non-potable water.

Present reuse of wastewater for municipal supplies is unplanned; its use poses many threats--undetected breakdowns in treatment facilities, the uncertain fate of viruses after treatment, and hundreds of new chemical compounds being introduced into wastewaters. If wastewater were treated and used for non-potable purposes, the demand on high-quality sources of raw water would be reduced, costs of providing reclaimed wastewater for non-potable uses would in many instances be less than the cost of developing additional high-quality water sources, the burden of pollution on bodies of water receiving wastes would be lessened, and the risk of ingesting contaminants in polluted water would be reduced. Colorado Springs, Singapore, and Baltimore now reuse wastewater for non-potable purposes. Direct reuse of wastewater deprives water of the benefits of time between discharge and recovery, dilution by streamwater, and disinfection by sunlight, sedimentation, and natural biochemical degradation. Reclamation of waste water for drinking poses problems because present or probably future treatment plants do not assure adequate reduction of chemical contaminants that are likely to be present in urban centers, operation of treatment facilities is almost always below design standards, technology for monitoring potable water is inadequate when water comes from contaminated sources, 'fail-safe' technology is unavailable, and the public is reluctant to ingest its own wastes. Dual water supply systems for potable and non-potable purposes are a possible solution, especially where fresh water is in short supply, at an apparent cost of only 20% higher than conventional systems. (Stein - North Carolina)
W74-02845

THE MUSKEGON COUNTY PLAN OF WASTE WATER REUSE.

Public Works, Vol 104, No 10, p 77-79, October, 1973. 2 fig, 2 photos.

Descriptors: *Water reuse, *Waste water treatment, *Tertiary treatment, Aeration, Municipal wastes, Sewage treatment, Sprinkler, Irrigation, *Michigan, Ground water.
Identifiers: *Spray irrigation, Land spreading, *Muskegon County (Mich.).

Muskegon County, Michigan is building a complete waste water treatment plant which will include spray irrigation as tertiary treatment. The cost is $38 million, 80% of which is paid by federal and state funds. The treatment site covers 10,000 acres located 11 miles east of the metropolitan area. One third of the cost will pay for the raw wastewater collection and transport system. At the site, raw waste water will be discharged into three aerated biological treatment cells equipped with 12 aerators and 6 mixers. BOD removal is expected to be 70 to 90% after this process in normal conditions. Effluent will then flow to two storage basins and a settling basin. Water will be chlorinated prior to irrigation, reducing coliform organisms to be expected 1,000 per ml. or less. Chlorinated effluent flows through a pipe system over 27 miles long to 55 irrigation machines each of which covers a radius of 750 to 1,300 feet. Irrigation area is 6,000 acres. The aerobic soil zone is expected to act as a 'living filter.' Effluent which has seeped throught the soil will be collected by a system of 35 wells and over 100 miles of drainage tiles and pipes before being disposed into natural watercourses. It is expected that water quality of the filtered and collected water will meet U.S.P.H.S. drinking water standards. Quality of treated water and nearby groundwater will be carefully monitored by 302 observation wells. (Stein - North Carolina)
W74-02846

WATER SUPPLY AND SEWAGE FACILITIES PLAN UPDATE--1970, LEHIGH-NORTHAMPTON COUNTIES, PENNSYLVANIA.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.

September 1971. 141 p, 23 fig, 21 tab, 6 appendices. H. V. Department.

Descriptors: *Planning, *Water supply development, *Sewerage, *Long-term planning, *Regional development, Sewers, Water treatment facilities, Municipal water, Urbanization, Pennsylvania, Water resources development.
Identifiers: *Lehigh County (Pennsylvania), *Northampton County (Pennsylvania).

The Commonwealth of Pennsylvania requires its municipalities to adopt and periodically update a plan for sewage systems pursuant to the Pennsylvania Sewage Facilities Act (Act 537). Further, the U.S. Department of Housing and Urban Development required the Joint Planning Commission of Lehigh-Northampton Counties to prepare a regional water and sewer facilities plan to serve as a guide for evaluating applications for federal grants-in-aid for water and sewer projects. The plan described in the report was adopted by the Commission on October 21, 1971. Detailed recommendations are given for improvements to the water and sewage systems in various service areas in the two counties. The goals of the update were formulated to support comprehensive regional objectives. Specific goals were outlined as follows: (1) to provide public sewerage and water systems in existing urbanized areas in the Lehigh Valley which presently do not have these facilities; (2) to provide public sewerage and water systems in portions of the Region that are designated in the Regional Comprehensive Plan for urban growth and development in the future; (3) to stage the development of public utility systems in such a way that the timing and sequence of construction relates directly to the growth of an orderly land development pattern and provision of other facilities such as new roads; (4) to develop regional public utility systems where such regional systems are more economical or efficient than a conglomeration of local municipal systems or where a regional system can effectively reduce existing or potential environmental problems; and (5) to reduce pollution problems in the Lehigh Valley. (Poertner)
W74-02848

APPLICATION AND OPERATION OF SLUDGE INCINERATION,
Saint Louis Metropolitan Sewer District, Mo.
For primary bibliographic entry see Field 05E.
W74-02849

ACTIVE PROJECTS, PURE WATERS RESEARCH.
New York State Dept. of Environmental Conservation, Albany.

August 1973. 29 p.

Descriptors: *Research and development, *Projects, *Research facilities, *Priorities, *New York, State governments, Water pollution control, Waste water disposal, Eutrophication, Waste water treatment.

Current active projects are listed of the Research and Development Unit of the New York State Department of Environmental Conservation. This unit has responsibility for identifying and fostering studies of important problems of environmental degradation affecting the people of New York State. It also has responsibility for developing effective procedures for halting or reversing such degradation. Some studies are carried out in-house while others beyond the capability of the Department and Unit are contracted to universities, private institutions and companies. A short description of each of the active projects is given. The titles of the nine active studies are: (1) Canadargo Lake Eutrophication Study, (2) Effectiveness of Lagoons as a Tertiary Treatment Device, (3) Evaluation of a Plastic Media Trickling Filter, (4) Fate of Applied Nutrients in Streams, (5) Land Disposal of Wastewater, (6) Nitrogen Removal by Chlorination, (7) Occurrence and Transport of Nutrients and Hazardous Polluting Substances, (8) Reduction of the Eutrophication of Lower St. Regis Lake by Point Source Phosphorus Removal, and (9) West Coxsackie Project. (Poertner)
W74-02851

4 WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05G.
W74-02856

NUCLEAR POWER PLANT HEAT REJECTION IN AN ARID CLIMATE,
Omaha Public Power District, Neb.
F. C. Scofield, and R. A. Fazzolare.
Paper presented at American Nuclear Society, Winter meeting, Miami Beach, Florida, October 2, 1971. 28 p, 9 fig, 5 tab, 7 ref.

Descriptors: *Cooling towers, *Ponds, *Spraying, *Evaporation, *Water conservation, *Mathematical models, Electric power, Thermal power plants, Heat transfer, Cooling, Evaporation control, Water reuse, Climatology, Model studies, Arid lands, *Waste water treatment.
Identifiers: Cooling ponds.

The factors influencing evaporation from a cooling tower, cooling pond, and a cooling pond with a supplemental spray system were investigated. Estimates of the monthly and annual evaporation for each alternative are presented. The evaporation for each alternative is based on a unitized cooling demand of 1000 BTU/hr and results are then applied to a typical 800 MWE light water reactor (LWR) power plant. The three factors which form the water source criteria for a steam power plant, cooling, withdrawal, and consumption, are discussed. Computations for mechanical draft towers are performed with an analytical heat and mass balance method which includes the influence of ambient air conditions and sensible heat transfer. Use of a spray system in cooling ponds permits design for storage requirements, thereby reducing the pond surface area and evaporation. A cooling tower is perhaps the most efficient method from the standpoint of water conservation due to the absence of solar heat input. All methods reportedly consume large quantities of water. (Jerome-Vanderbilt)
W74-02887

THE FULL-SCALE REFINEMENT OF PURIFIED SEWAGE FOR UNRESTRICTED INDUSTRIAL USE IN THE MANUFACTURE OF FULLY BLEACHED KRAFT-PULP AND FINE PAPER,
National Inst. for Water Research, Pretoria (South Africa).
L. R. J. Van Vuuren, J. W. Funke, and L. Smith.
In: Advances in Water Pollution Research, Sixth International Conference, Jerusalem, June 8-23, 1972, p 627-636, 2 fig, 3 tab, 5 ref. Edited by S. H. Jenkins, Pergamon Press, N.Y. 1973.

Descriptors: *Pulp and paper industry, *Sewage treatment, Water reuse, Flocculation, Flotation, *Waste water treatment, Pulp wastes, Industrial wastes.
Identifiers: *Alum treatment, Excess lime treatment, South Africa.

A paper mill using purified sewage as its major source of water has experienced difficulty in meeting the increasingly rigorous brightness demands for fine bleached paper due to the presence of residual organic matter and heavy metals in the purified sewage. In laboratory-scale investigations flocculation with lime and alum gave better results than treatment with chlorine gas, sodium hypochlorite or calcium hypochlorite, or filtration through activated carbon or beds of various absorbents. Pilot plant investigations based on excess lime treatment and flocculation with alum confirmed the favorable results obtained with the former but showed that difficulties could be expected due to scaling. Water flocculated with alum required neutralization to prevent corrosion, and the reduction of heavy metals was not as good as with the lime treatment although this had little adverse effect on the brightness of the pulp; the removal of organics was of the same order as with lime treatment, and operational difficulties were less due to the absence of scale. The flotation principle proved to be far preferable to sedimentation, for not only are detergents removed but the size of the plant is reduced considerably. A full-scale plant to treat 32,000 m3/d of purified sewage effluent with alum has been erected. (DWA)
W74-02906

LAKE MICHIGAN DISCHARGE STUDIES.
Illinois Inst. for Environmental Quality, Chicago.
For primary bibliographic entry see Field 05B.
W74-02954

CELL YIELD AND GROWTH RATE IN ACTIVATED SLUDGE,
Cornell Univ., Ithaca, N.Y. School of Civil and Environmental Engineering.
For primary bibliographic entry see Field 05C.
W74-02960

THE MICROBIAL ASSOCIATIONS DEVELOPING ON EXPERIMENTAL TRICKLING FILTERS IRRIGATED WITH DOMESTIC SEWAGE,
Bath Univ. (England). School of Biological Sciences.
For primary bibliographic entry see Field 05A.
W74-02987

A THEORETICAL STUDY OF FACTORS INFLUENCING THE MICROBIAL POPULATION DYNAMICS OF THE ACTIVATED-SLUDGE PROCESS - I. THE EFFECTS OF DIURNAL VARIATIONS OF SEWAGE AND CARNIVOROUS CILIATED PROTOZOA,
Pollution Research Lab., Stevenage (England).
C. R. Curds.
Water Research, Vol 7, No 9, p 1269-1284, September 1973. 8 fig, 1 tab, 13 ref.

Descriptors: *Sewage bacteria, *Activated sludge, *Flow rates, Population, *Mathematical models, *Protozoa, *Growth rates, Diurnal, Competition, Computer models, Computer programs.
Identifiers: *Flagellates, Substrates, Litonotus, Hemiophrys, Trachelophyllum, Amphileptus, Vorticella, Carachesium, Opercularia, Coleps hirtus, Paramecium, Acineta, Podophrya, Aspidisca, Euplotes.

Mathematical models and computer simulations have been used in examining the theoretical implications of diurnal variations in sewage flow, bacterial content of the sewage, and sewage substrate concentration on the microbial population dynamics and effluent quality of a completely-mixed activated-sludge plant. Variations in sewage substrate resulted in variations in the concentrations of substrate in the effluent and bacteria in the sludge. Variations in the bacterial content of sewage affected only the bacteria-consuming ciliate populations whereas variations in the flow of sewage affected all populations. When all three sewage parameters were varied simultaneously the effect was cumulative. The effects of carnivourous ciliates preying on bacteria-consuming ciliates have been considered for the first time. At least four types of ciliate predator/prey situations could arise since both carnivore and prey can be either free-swimming or attached forms. In general, when the carnivore was a free-swimming form, oscillations, which may or may not dampen, were obtained; when the carnivore was an attached form, the ciliate prey was washed out of the reactor. However, the predictions of the population dynamics of the organisms also depend to a large extent on the values of the various growth constants used. (Little-Battelle)
W74-02996

INDIRECTOR CHLORINATOR,
Koehler-Dayton, Inc., New Britain Conn. (Assignee).
R. D. Russo.
U. S. Patent No 3,762,553, 3 p, 2 fig, 1 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 160, October 2, 1973.

Descriptors: *Patents, *Sewage treatment, Boats, *Waste water treatment, Water pollution control, Pollution abatement, *Chlorine, Additives, Equipment, *Chlorination.

A sewage treatment system is particularly adapted for use in small boats. An additive for treating the sewage is stored in dry form, such as in tablets, in a tank separate from, but in communication with, the sewage treatment chamber. Flushing a toilet associated with the system automatically activates a water pump and causes water to be pumped from a separate source into the additive tank, dissolving a portion of the additive, and the flowing, from the tank into the treating chamber. At the same time a combination macerating and mixing unit is energized to reduce solid sewage to at least a maximum particulate size and vigorously mix and remacerate the reduced sewage with the dissolved additive flowing from the tank into the chamber. (Sinha-OEIS)
W74-02999

THERMOLYTIC SEWAGE SYSTEM,
L. M. Crampton.
U.S. Patent No 3,762,549, 3 p, 11 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 159, October 2, 1973.

Descriptors: *Patents, *Sewage treatment, *Evaporators, *Waste water treatment, Pollution abatement, *Air pollution, Water conservation, Water pollution control, *Incineration.

Sewage is burned to a fine ash and the products of combustion are utilized to heat domestic hot water as well as preheat the sewage in a holding tank. Sewage flowing from a building passes through a spherical grinder to reduce and disperse the solids through the liquid. The sewage then passes into a holding tank and from there to an evaporator. The products of combustion from the evaporator heat domestic hot water as well as preheat the tank with condensate from the products of combustion passing to a second holding tank and from there into the ground. The gaseous products of combustion flow upwardly through a stack to the air. The primary object is to provide a system for treating sewage which eliminates both ground and air pollution while reducing the sewage to a fine ash and completely burning gaseous components. (Sinha-OEIS)
W74-03001

SLURRY CONCENTRATOR AND FILTER APPARATUS,
A. H. Parmentier.
U. S. Patent No 3,762,551, 4 p, 6 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 159, October 2, 1973.

Descriptors: *Patents, *Filtration, *Slurries, *Pulp wastes, Colloids, Filters, *Waste water treatment.
Identifiers: *Paper mill wastes.

The apparatus has flat rectangular filtration cells of relatively simple, inexpensive construction. The filtration cells are stationary and mounted on stationary filter pipes. From time to time collected solids from the filtered slurry are removed by scrapers which loosen the solid material so that it falls to the bottom of a filter tank or reservoir from which the solid material or concentrated slurry is removed. The entire screening or straining area of the filter cells is always wholly immersed in the slurry being filtered. The apparatus can operate continuously, with filtrate being constantly removed, while fresh slurry is fed to the apparatus. Periodically the screening areas or surfaces are scraped clean by scrapers carried by a simple moving frame structure. The apparatus can be drained periodically and the screening areas can be flushed with a washing liquid ejected by spraying nozzles carried by the moving frame structure. The washing liquid is sprayed only during movement of the frame structure. The consumption of washing liquid is minimized and the concentration of slurry is maximized. The apparatus is arranged so that filtration and concentration of slurry can be continuous or can be performed discontinuously on predetermined quantities of slurry. The apparatus is particularly well adapted for use in paper mills where slurries containing fillers, glue, wax, resin and other colloidal materials can be concentrated and removed from the slurries. (Sinha-OEIS)
W74-03003

CONTINUOUSLY REGENERATING ACTIVE EARTH FILTERING APPARATUS FOR LIQUID WASTES,
Wallover Oil Co., East Liverpool, Ohio. (Assignee).
J. I. Wallover.
U. S. Patent No 3,762,554, 3 p, 6 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 160, October 2, 1973.

Descriptors: *Patents, *Waste water treatment, *Filtration, *Liquid wastes, Pollution abatement, Water quality control, Water pollution control, Filters.
Identifiers: Activated earth.

A continuously rotating annular foraminous table has concentric upper side walls extending upwardly from its opposite sides and concentric lower side walls extending downwardly from those sides. Overlying a segment of the table is a stationary arcuate open-bottom furnace that receives the upper side walls. A bed of activated earth is maintained on the table as the filtering material. Adjacent the exit end of the furnace there is means for delivering onto the bed a waste liquid to be filtered. Air is drawn down through the area of the bed and table outside of the furnace. A trough below that area collects the filtrate. Air is blown up between the lower side walls of the table and through the table and bed into the furnace, and means are provided in the furnace for burning out combustible contaminants collected in the bed during filtering, whereby to regenerate the bed. Smoke from the furnace is burned, and gases and solids are scrubbed out of the exhaust. (Sinha-OEIS)
W74-03004

FILTER BOTTOM AND MOLDED MODULE THEREFOR,
Rostone Corp., Lafayette, Ind. (Assignee).
M. G. Knoy, L. M. Alt, and W. M. Work.

U. S. Patent No 3,762,559, 11 p, 34 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 161, October 2, 1973.

Descriptors: *Patents, *Waste water treatment, *Filters, *Filtration, Equipment, Water quality control, Water pollution control, Pollution abatement.

A filter bottom module is provided which can be prefabricated in complete form and made in large sizes of low weight. The modules are molded of high-strength reinforced plastic in a configuration which facilitates installation and provides adequate strength to support the filter bed and withstand backwash pressures. Each module has a horizontal structural floor section formed with a horizontal wall integrally reinforced by vertical sidewalls and a network of reinforcing ribs. Its side walls are formed to interlock with each other and define grooves for the reception of grout or other sealing compound. (Sinha-OEIS)
W74-03006

APPARATUS FOR SEPARATING PAINT OR THE LIKE FROM WATER,
Otto Durr K.G., Stuttgart (West Germany). (Assignee).
R. Eisenmann.
U. S. Patent No 3,764,013, 6 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 519, October 9, 1973.

Descriptors: *Patents, Separation techniques, *Paints, *Water purification, Wastes, *Filtration, *Coagulation, *Waste water treatment, Water quality control, Water pollution control.

A method and apparatus are provided for separating paint or similar substances from water before it is passed into a lake, river or other body of water. The contaminated water is mixed with a coagulant and compressed air to form a foamy mixture. The foam floats quickly to the surface of the water. The foam may be wiped from the surface and the water filtered before being discharged. The apparatus is designed as a circular unit requiring relatively little ground space in which the various separating containers are of an annular shape surrounding each other about a common axis. The coagulator is mounted above the central cylindrical space within the innermost annular container and extends coaxially thereto. (Sinha-OEIS)
W74-03008

METHOD FOR TREATING SEWAGE,
Cole Resedevel Corp., Fairlawn, N.J. (assignee)
W. R. Preis, and W. Cole, Jr.
U. S. Patent No. 3,766,033, 5 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 915, No 3, p 1020, October 16, 1973.

Descriptors: *Patents, *Sewage treatment, *Chemical reactions, Color, Odor, Bacteria, Oxides, Chlorides, *Waste water treatment, Pollution abatement, Water quality control, *Oil wastes, Water pollution control, Flocculation.
Identifiers: Sodium hydroxide, Fatty substances.

A two-stage separator cell is used in a sewage treatment method. In the first stage laminar flow of the liquid is effected and electrical energy introduced into the liquid. Treatment of the effluent results in the separation of certain of the salt and water ions to produce free ions and, through a chemical reaction, sodium hydroxide. The sodium hydroxide causes a breakdown of fatty and oily substances into less complex settleable particules while the oxygen and chloride attack living organisms and colors and odors to cause a bleaching action and to oxidize bacteria and other organic material which is in suspension. In the second stage any existing residual ionization is cancelled out with a resultant rapid separation and flocculation of the solids in the solution with the air of certain oxides and chlorides. (Sinha-OEIS)
W74-03012

SEWAGE TREATMENT VESSEL,
A. D. Thompson.
U. S. Patent No. 3,767,051, 5 p, 8 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1294, October 23, 1973.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, Equipment, *Aeration, Sediments, *Chlorination, Baffles, Water quality control, Water pollution control.

The sewage treatment vessel is constructed of fiberglass having arcuate shaped inner surfaces for the top, bottom, and side walls. All the inner surfaces are provided with reinforcing ribs which assist in breaking up large particles during agitation of the effluent. The vessel contains a primary settling chamber for receiving raw sewage, an aeration chamber having staggered, transverse baffles to optimize passage of oxygen to the effluent during the digestion process. There is a clarifying chamber for receiving the overflow from the aeration chamber. The clarifying chamber is provided with a sloped wall having an opening adjacent to the lower edge for reintroducing the sedimentary particles back into the aeration chamber for further digestion and decomposition. The effluent may be chlorinated before ultimate disposal. (Sinha-OEIS)
W74-03016

SURFACE AERATOR HAVING WAVE ATTENUATOR,
Passavant-Werke, Michelbach (West Germany). Michelbacherhutte. (assignee)
H. Auler.
U. S. Patent No. 3,767,175, 4 p, 4 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1327, October 23, 1973.

Descriptors: *Patents, *Waste water treatment, *Aerators, Equipment, Baffles, Aeration, *Baffles.

The aeration tank has at least one surface aerator which creates surface waves. One or more baffle plates extend in a horizontal direction. The baffle plates are located on or just below the surface of the liquid at or near the tank wall - the impingement zone. Such baffles influence wave formation and reflection at the tank wall by splitting the incoming waves before they impinge upon the tank wall so the vertical energy is changed into horizontally directed flow energy. (Sinha-OEIS)
W74-03018

GRANULAR TO POWDERED ACTIVATED CARBON IN POLLUTED WATER PURIFICATION PROCESS,
Atlas Chemical Industries, Inc., Wilmington, Del. (assignee)
K. E. Clapp.
U. S. Patent No. 3,767,570, 4 p, 1 fig, 2 tab, 8 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1419, October 23, 1973.

Descriptors: *Patents, *Waste water treatment, *Activated carbon, *Aeration, *Activated sludge, Water pollution control, Water quality control, *Pollution abatement.

Wastewater is treated with spent granular activated carbon that has been ground to a powder. The partially treated wastewater is then separated from the powdered carbon-sludge contained in it and passed through a bed of granular activated carbon. As the granular activated carbon becomes spent, it is ground to a powder for contacting the wastewater. Screened raw sewage is fed into a primary settling tank. Supernatant primary effluent is withdrawn from the primary settling tank and fed into the aeration tank. Spent granular activatedcarbon is withdrawn from the bottom of the carbon column and fed as a slurry into a wet grinder. Spent granular activated carbon is ground to an aqueous powder slurry and conveyed from the wet grinder to the aeration tank to be thoroughly mixed and contacted with effluent in the aeration tank. The activated sludge mixture from the aeration tank is then fed into a secondary settling tank. The supernatant secondary effluent is fed to the bottom of the granular carbon column and the final effluent exists. (Sinha-OEIS)
W74-03019

OIL REMOVAL FROM WASTE WATERS,
Nalco Chemical Co., Chicago, Ill. (assignee)
W. F. Lorenc, and J. A. Hyde.
U. S. Patent No. 3,767,571, 4 p, 4 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1419, October 23, 1973.

Descriptors: *Patents, *Oil pollution, Organic compounds, *Waste water treatment, *Adsorption, Pollution abatement, Water pollution control, Water quality control, Separation techniques.
Identifiers: *Magnetite.

Magnetite is to be used as an adsorbent to remove oil or other organic contaminants from waste water. Magnetite particles are added to the waste water and the mixture is agitated. The magnetite particles laden with adsorbed oil are then removed. Removal may be accomplished by filtration or by magnetic separation. (Sinha-OEIS)
W74-03020

THE LIQUID WASTE FACILITIES FUNCTION CONCEPT.
Charlotte, N.C. USAC Project.

Available from NTIS, Springfield, Va. 22151 as PB-220 100 Price $3.00 printed copy; $1.45 microfiche. The Charlotte Integrated Municipal Information System Project Report MIS-2301/018/00, July 1972. 233 p.

Descriptors: *Water pollution control, *Liquid wastes, *Cities, *North Carolina, Systems analysis, *Waste water treatment, Urbanization, Urban hydrology, Computers, Computer programs, Information retrieval, Design criteria, Waste disposal, Methodology, Water pollution sources, Monitoring.
Identifiers: *Charlotte (NC).

Activities from systems analysis through implementation and evaluation of urban information systems are described. The report, one of a series of Systems Conceptualization reports, documents the Charlotte Consortium's conceptualization of the City's liquid waste function, including the provision of a sanitary sewage system which treats and disposes of liquid wastes, both residential and industrial. Liquid waste facilities must be constructed and maintained, and the waste output of industries must be monitored and analyzed to determine acceptability of the industrial waste under appropriate municipal ordinances. Intended to serve as a basis for and facilitate the design of modulus related to the subject area, this document provides an in-depth operational discussion of the responsibilities defined for the function, its components and processes and relates how information systems technology may be used in the administration of these responsibilities. Included are graphic illustrations depicting user/system interaction, system products and inputs, user procedures and computer program and data requirements, and discussions of the informational relationships that exist or should exist between the subject function and other city functions. (Woodard-USGS)
W74-03039

THE ACTIVATED SLUDGE PROCESS USING HIGH-PURITY OXYGEN FOR TREATING KRAFT MILL WASTEWATER,
Union Carbide Corp., Tonawanda, N.Y. Linde Div.
R. J. Grader, W. D. South, and B. Djordjevic.
Tappi, Vol 56, No 4, p 103-107, April 1973. 3 fig, 2 tab, 10 ref.

Descriptors: *Oxygenation, *Waste water treatment, *Pulp wastes, *Water pollution treatment, *Biochemical oxygen demand, Microorganisms, Sludge treatment, Dewatering, Nutrients, Suspended solids, Dissolved oxygen, Oxygen, Pilot plants, Industrial wastes, Pulp and paper industry, Treatment facilities, Feasibility studies.
Identifiers: Kraft mills, Condensates, Wash water, Black liquor, White water.

In a pilot-plant feasibility study of an oxygenation system for kraft mill effluent treatment, a 1600-gal oxygenation reactor was divided into four stages by baffles and provided with a gastight enclosure. The treated waste water came from four sources, i.e., pulp wash liquor, condensates (from liquor evaporation, digester blow heat, and turpentine recovery), papermachine operation, and black liquor recovery. Their organic loads ranged from 171 to 594 lb of 5-day BOD/day/1000 cu ft, corresponding to food/microorganism ratios of 0.46-1.40 lb of BOD/day/lb of mixed liquor volatile suspended solids. A constant BOD removal rate of 91% was maintained over this entire range, the pilot plant being operated consistently at dissolved oxygen concentrations above 5 mg/liter and at mixed liquor suspended solids levels of 5000-7000 mg/liter. The secondary sludge generated, in amounts lower than reported literature values, showed good settling and thickening (dewatering) properties. Its settling ability did not diminish as the F/M ratio was raised above 1.3 and as organic loads reached 600 lb of BOD/1000 cu ft of tank volume. (Brown-IPC)
W74-03068

THERMAL DRYING OF ACTIVATED SLUDGE FROM PURIFICATION EQUIPMENT (TERMOSUSHKA AKTIVNOGO ILA OCHISTNYKH SOORUZHENII),
I. Z. Lipovkov, V. A. Shteerman, and A. I. Kochetkov.
Bumazhnaya Promyshlennost', No 3, p 11-12, March 1973. 1 fig, 2 tab.

Descriptors: *Sludge treatment, *Sludge disposal, *Pulp wastes, *Dewatering, *Drying, Treatment facilities, Activated sludge, Pulp and paper industry, Incineration, Fuels, Fertilizers, Moisture content, Byproducts, *Waste water treatment.
Identifiers: Particle size reduction, Grinding, Grinders, Soviet Union.

In many Soviet pulp and paper mills, spent activated sludge is dewatered in vacuum filters and then dried in heated drum dryers. Because of the low efficiency of these dryers, the discharged sludge is heterogeneous, still contains about 40% moisture, and is mostly disposed on dump heaps which threaten nearby waters by leakage. Studies at the Arkhangel'sk and Baikal pulp and paper mills suggested that drum dryers be replaced by flue gas-heated grinders, and that the dewatered and comminuted sludge be burned as fuel in steam-generating plants. The design and operation of proposed sludge-handling installations are explained. They should be able to process sedimentation tank sludge jointly with excess activated sludge, possibly into a dried product that could be partly marketed as fertilizer. (Stapinski-IPC)
W74-03070

ADDITIONAL PURIFICATION OF CHEMICALLY TREATED EFFLUENTS (DOOCHISTKA KHIMICHESKI OBRABOTANNYKH STOCHNYKH VOD),
G. P. Kuchin, G. A. Romanov, E. A. Perednya, Yu. M. Smirnov, and Yu. I. Rusanovich.
Bumazhnaya Promyshlennost', No 4, p 12-13, April 1973. 1 fig, 1 tab, 4 ref.

Descriptors: *Suspended solids, *Waste water treatment, *Pulp wastes, Pollution abatement, Water pollution treatment, *Filtration, *Filters, *Sands, Effluents, Industrial wastes, Particle size, Chemical precipitation, Sedimentation, Pollutants, Regulation, Water quality control, Lignins, Lipids.
Identifiers: Kraft mills, Tall oil, Sulfate soap, Rosin acids, USSR, Fatty acids, Washing.

After chemical sedimentation, kraft mill effluents still contain 30-35 mg/liter of suspended solids, such as lignin, rosin acids, fatty acids, sulfate soap, tall oil, and other materials resistant to biooxidation. Two types of sand filters (having particle sizes of 0.5-1.5 and 0.8-2.0 mm) were used in the experimental purification of a typical presedimented kraft effluent. The finer sand reduced the suspended solids from 10-30 to 1-3 mg/liter at a flow rate of 5-7 m/hr, or to 5-7 mg/liter at a filtration rate of 10 m/hr. However, an accumulating film of pollutants on the surface of sand particles proved difficult to remove by washing. The coarser sand lent itself more readily to washing, but achieved a lower solids reduction, though the results were still within the limits permitted for discharge into Soviet rivers (0-5 mg/liter). Both sands were equivalent in reductions of BOD and effluent color. (Stapinski-IPC)
W74-03071

MULTISTAGE SYSTEM FOR BIOLOGICAL PURIFICATION OF WASTE WATERS (MNOGOSTUPENCHATAYA SISTEMA BIOLOGICHESKOI OCHISTKI STOCHNYKH VOD),
V. E. Plyaka, L. I. Shmidt, V. M. Shapchenko, and V. V. Lobko.
Bumazhnaya Promyshlennost', No 4, p 10-11, April 1973. 1 tab, 1 fig, 7 ref.

Descriptors: *Pulp wastes, *Bleaching wastes, *Treatment facilities, *Waste water treatment, *Aeration, Biochemical oxygen demand, Pulp and paper industry, Organic loading, Sedimentation, Equipment, Pollution abatement, Industrial wastes.
Identifiers: Multistage treatment, Kraft mills, Tanks, White water, Black liquor, USSR.

A Soviet kraft pulp and paper mill equipped with two parallel lines for processing of combined black and white waste waters was converted into a two-stage treatment installation, in which the black effluent is treated in the first stage and the white effluent is mixed with the partly purified black effluent in the second stage. Black effluent comprises waste waters from pulpwood preparation, digester room, pulp-washing and screening rooms, recovery boiler, and yeast fermentation. White effluent includes bleach plant discharges, paper machine white water, and waste waters from fiber recovery and process water pretreatment. The black effluent treatment stage utilizes a 3700 cu m preaerator, two aeration tanks (23,240 cu m), two secondary sedimentation tanks, and auxiliary equipment for a total aeration capacity of 26,940 cu m. It processed 5.5-24.5 tons of organic load/day and reduced the 5-day BOD to 12-50 mg/liter. The white effluent treatment line (second stage) has two preaerators (21,600 cu m), four aeration tanks (56,160 cu m), four sedimentation tanks, and auxiliary equipment for a total aeration capacity of 77,760 cu m. Being relatively undercharged (compared to the first-stage equipment), the second stage processed 1-3 tons of organic pollutants and uniformly reduced the 5-day BOD to 15 mg/liter or less. The load distribution between the two stages makes it possible to disconnect one preaerator and three aeration tanks of the second stage without effect on purification efficiency. (Stapinski-IPC)
W74-03072

CHARACTERIZATION OF SULFITE PULP BLEACHING EFFLUENTS AND THEIR BEHAVIOR DURING BIODEGRADATION (ABWASSERTECHNISCHE CHARAKTERISIERUNG VON SULFITZELLSTOFFBLEICHEREI-ABWASSERN UND DEREN VERHALTEN BEIM BIOLOGISCHEN ABBAU),
A. Scherler.
Wochenblatt fuer Papierfabrikation, Vol 100, No 14, p 523-526, July 31, 1972. 7 tab, 4 fig.

Descriptors: *Biological treatment, *Waste water treatment, *Bleaching wastes, *Pulp wastes, *Activated sludge, Industrial wastes, Pulp and Paper industry, Chlorination, Waste treatment, Coniferous trees, Deciduous trees, Hardwood, Softwood, Chlorine, Toxicity, Chlorides, Biochemical oxygen demand, Chemical oxygen demand, Hydrogen ion concentration, Suspended solids, Effluents, Waste water (Pollution), *Biodegradation.
Identifiers: Beech trees, Spruce trees, Delignification, Pulp hardness, Cooking degree, Permanganate number, Hypochlorites, Chlorine dioxide, Alkaline extraction.

Extensive data are tabulated on various characteristics of bleach plant effluents obtained after chlorination, alkaline extraction, hypochlorite, and chlorine dioxide treatments of spruce vs. beech sulfite pulps. These data include pH, total solids, suspended solids, ash (combustion residue), permanganate number, chloride content, COD, and 5-day BOD before and after biological treatment for 24 hr. Depending on the wood species (coniferous vs. deciduous) and the cooking degree, the measured specific pollution loads varied from 12.3 to 25 kg/oven-dry ton of unbleached pulp for spruce, and from 22.1 to 23.4 kg/ton for beech. Provided the free Cl content did not exceed 3 mg/liter, no toxic inhibition of activated sludge microorganisms occurred. Through biological treatment alone, bleachery wastes from spruce pulps cooked to medium 'hardness' (delignification degree) could be reduced in BOD from 20 to 2-3 kg/t, in COD from 125 to 59-68 kg/t, and in permanganate value from 290 to 145-170 kg, or from 73 to 37-43 kg/ton. (Speckhard-IPC)
W74-03073

COLOR REMOVAL AND SLUDGE RECOVERY FROM TOTAL MILL EFFLUENT,
Continental Can Co., Inc., Hodge, La.
E. L. Spruill.
Tappi, Vol 56, No 4, p 98-100, April 1973. 1 fig, 8 ref.

Descriptors: Treatment facilities, *Pulp wastes, *Waste water treatment, *Coagulation, *Sludge treatment, *Lime, *Color, Industrial wastes, Incineration, Dewatering, Centrifugation, Sludge disposal, Sedimentation, Pollution abatement, Industrial wastes, Pulp and paper industry, Louisiana.
Identifiers: Kraft mills, Neutral sulfite pulping, Chemical recovery, Lime kilns, Carbonation.

At the unbleached kraft pulp mill of Continental Can Co. in Hodge, La., the collected effluents are being decolored by a lime treatment integrated into the mill's lime-processing system which permits recovery of both lime and fibrous sludge. A dosage of about 1000 ppm of lime achieves a color reduction of 80-90% in kraft effluents and somewhat lower reductions in neutral sulfite pulping wastes. The sludge is dewatered by centrifugation and incinerated in the lime kiln. The colored sludge has excellent settling and thickening properties while sludge from the carbonation stage shows somewhat variable sedimentation behavior. (Brown-IPC)
W74-03077

ANALYSIS OF ORGANIC MATERIALS IN WASTEWATER EFFLUENTS AFTER CHLORINATION,
North Texas State Univ., Denton. Dept. of Chemistry; and North Texas State Univ., Denton. Inst. for Environmental Studies.
For primary bibliographic entry see Field 05A.
W74-03081

WASTEWATER CLEANUP EQUIPMENT.

Noyes Data Corp., Park Ridge, N.J. 2nd edition 1973. 372 p. $36.00.

Descriptors: *Treatment facilities, *Equipment, *Pollution abatement, *Sewage treatment, *Waste water treatment, Reverse osmosis, Ion exchange, Oxidation, Oxygenation, Ozone, Filers, Filtration, Cooling, Adsorption, Diffusion, Flocculation, Flotation, Aeration, Chemical precipitation, Sedimentation, Pumps, Pipelines, Screens, Sludge treatment.
Identifiers: Directories, Buyers' guides, Chemical reactors.

This guide, selected and compiled from manufacturers' literature, provides technical design and operating data, specifications, and related graphic information on commercially available equipment useful in water pollution control, sewage and effluent treatment, and similar environmental protection methods. An index to types of equipment and installations is included. Typical units and reactors include adsorbers, aerators, diffusers, air compressors, clarifiers, comminutors, degasifiers, trickling and other filters, flocculators, flotators, ion exchangers, oil skimmers and extractors, pipelines, pumps, pneumatic ejectors, screens, settling tanks, sludge collectors and thickeners, water coolers, reverse osmosis modules, and oxygenation and ozonation reactors. (Brown-IPC)
W74-03082

DETOXIFICATION OF KRAFT MILL EFFLUENTS BY FOAM SEPARATION,
B.C. Research Ltd., Vancouver.
K. S. Ng, J. C. Mueller, and C. C. Walden.
Pulp and Paper Magazine of Canada, Vol 74, No 5, p 119-123 (Technical Paper T187-191), May 1973. 2 fig, 6 tab, 18 ref.

Descriptors: *Toxicity, *Pulp wastes, *Bleaching wastes, *Waste water treatment, *Foam separation, Pulp and paper industry, *Canada, Hydrogen ion concentration, Foaming, Separation techniques, Pollution abatement, Aquatic life, Water pollution treatment, Biochemical oxygen demand, Organic loading, Effluents, Pollutants, Water pollution sources, Kraft mills.

An evaluation of foam separation as a method for removing toxic components from aqueous effluents of five bleached kraft pulp mills in British Columbia resulted in the successful detoxification of caustic extraction effluents and of combined mill effluents. Acid bleach effluents and unbleached white waters were difficult to detoxify, but their foaming characteristics could be improved and made amenable to foam detoxification by mixing them with treatable effluents. The pH of waste waters played a critical role in the detoxification process. In addition to removing toxic components, foam separation also reduced the foaming tendency of receiving waters. Concurrent reductions of BOD and total organic carbon (TOC) were minimal, averaging only about 12%. Practical implications of foam separation are also discussed. (Brown-IPC)
W74-03084

EFFLUENT TREATMENT PLANTS IN THE FOREST PRODUCTS INDUSTRY (PUUNJALOSTUSTEOLLISUUDEN JATEVESIPUHDISTAMOT),
Helsinki Univ. of Technology, (Finland). Dept. of Forest Products.
H. Nilsen.
Paperi ja Puu (Papper och Tra), Vol 54, No 4, p 255-257, 259-262, April, 1972. 6 fig, 5 ref. (English summary).

Descriptors: *Treatment facilities, *Europe, *Foreign research, *Pulp wastes, *Industrial wastes, *Waste water treatment, Instrumentation, Monitoring, Pilot plants, Research and development, Pollution abatement, Effluents, Pollutant identification, Waste water (Pollution).
Identifiers: Finland, Scandinavia, Forest products industries, Helsinki Technological Institute9finland).

The characteristics of forest industry effluents, notably those from Finnish pulp and paper mills, and their composition are surveyed. The most common effluent treatment methods used in Scandinavia are reviewed. Possible objectives for measurement and control devices in purification plants are listed. The instrumentation of such pilot plants at the Technological Institute of Helsinki (Pulp Technology Laboratory) is illustrated, and an example of an advanced purification and monitoring system is presented. (Brown-IPC)
W74-03087

A GERMAN FILTER BELT PRESS (LA SIEBBANDPRESSE),

La Papeterie, Vol 94, No 9, p 748-749, September 1972. 3 fig.

Descriptors: *Treatment facilities, *Waste water treatment, Equipment, Filters, *Screens, *Separation techniques, *Sludge treatment, *Dewatering, Flocculation, Suspended solids, Industrial wastes, Waste treatment, Clogging.
Identifiers: Belt filters, Presses, *Filter presses.

A filter press (called 'Siebbandpresse') for separating sludge from industrial waste waters is described and illustrated. The waste water is pressed between an endless belt and an endless screen as the two pass over a series of rolls in a sinusoidal arrangement. Flocculants are added to the water continuously to yield a highly concentrated sludge. The endless filter belt has screen openings varying in mesh size from 200 to 1.5 micrometer, with the result that clogging is virtually eliminated. (Speckhard-IPC)
W74-03088

A NEW STEP TOWARD WASTE WATER TREATMENT (UN NOUVEAU PAS VERS LE TRAITEMENT DES EAUX USEES).

Le Papeterie, Vol 94, No 9, p 747-748, September 1972.

Descriptors: *Dewatering, *Centrifugation, *Sludge treatment, *Waste water treatment, *Flocculation, *Polyelectrolytes, Suspended solids, Centrifugal pumps, Industrial wastes, Separation techniques.
Identifiers: Sharples Super-D-Canter, Centrifuges, Flocculants.

With the aid of recently developed polyelectrolytic flocculants, centrifuges such as the 'Sharples Super-D-Canter' have become highly effective in separating sludge from industrial waste waters. Up to 99% of suspended solids can be separated, and sludges of 20-30% dryness can be obtained. (Speckhard-IPC)
W74-03089

UNSTEADY FLOW IN SEWER NETWORKS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
A. S. Sevuk.
Available from the National Technical Information Service as PB-226 630 $10.00 in paper copy; $1.45 in microfiche. Ph D Thesis, 1973. 142 p, 29 fig, 3 tab, 47 ref. OWRR B-043-ILL (7).

Descriptors: *Unsteady flow, *Storm drains, *Urban hydrology, *Mathematical models, Design criteria, Conduits, Hydraulic design, Drainage systems, Separated sewers, Forecasting, Equations, Storm runoff, Urban drainage, Correlation analysis, Hydrologic data, Numerical analysis, Methodology.
Identifiers: *Storm sewer networks.

A mathematical simulation model was developed for unsteady free-surface flows in urban storm sewer systems with prescribed inflows. The model is intended to serve a dual purpose--flow prediction in existing sewer systems and systematic hydraulic design of the size of the sewers of an entire sewer system. The model utilizes the complete St. Venant equations rather than any of their simplified forms to describe the flow in the sewers, and it also incorporates the backwater conditions at the sewer junctions. Furthermore it includes a built-in design algorithm for determination of the sewer sizes, which is lacking in all the previously developed routing models. The St. Venant equations, when solved numerically, can accurately reproduce the experimentally observed unsteady free-surface flows in single circular conduits. To extend the numerical solution of the St. Venant equations from a single sewer to tree-type sewer systems, the hydraulic characteristics of the junctions must be considered, and a means to account for the backwater effects, i.e., mutually dependent internal boundary conditions, must be employed. Perhaps the most potential application of the model in the near future would be the identification of important parameters that affect the runoff process in storm sewer systems and consequently the development of simplified routing procedures. (Woodard-USGS)
W74-03095

ENVIRONMENTAL ASSESSMENT; POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY, ANNEX B.
VTN Nevada, Las Vegas; and Jones and Stokes Associates, Inc., Las Vegas, Nev.

Final report, prepared for Las Vegas Valley Water District, Nevada. November, 1972. 166 p, 5 fig, 8 tab, 96 ref, 6 append., photos.

Descriptors: *Environmental effects, *Limiting factors, *Waste water disposal, *Water pollution control, *Nevada, Irrigation effects, Habitats, Water transfer.
Identifiers: *Las Vegas Valley (Nev.), *Las Vegas Valley Wash and Bay, Lake Mead (Nev.), Dry Lake (Nev.).

Groundwaterrecharge, complete treatment, return to the Colorado River, export to Dry Lake, Eldorado Lake, Hidden Valley and Jean Lake, a combination of alternatives, deep well disposal, and no action were evaluated separately as possible solutions to accomplish waste water management in Las Vegas Valley and eliminate pollution in Lake Mead. EPA guidelines, Council on Environmental Quality guidelines, the National Environmental Policy Act of 1969, and air and water quality standards were used as constraining and regulating guidelines and are summarized. Complete treatment rated the best alternative environmentally. Some conclusions were: (1) None of the alternatives as planned will completely meet the goal of eliminating the pollution of Lake Mead. Highly saline groundwater will continue to surface in Las Vegas Wash and flow into Lake Mead when direct discharges are stopped. (2) Las Vegas Wash will continue to exist as a permanent riparian environment, although reduced in area, even if direct discharges are stopped. An unknown amount of groundwater surfaces and flows are now in the Wash, and will continue. (3) In-valley irrigation of existing and new greenbelt areas may create offsetting environmental impacts, possibly leading to a salt buildup in the soil, decreasing the water quality in the near surface aquifer. This water will flow downslope and surface in Las Vegas Wash

(4) Dry Lake is best suited for the evaporation of effluent. (5) Application of waste water for agriculture, evaporation, or percolation will probably adversely affect regional groundwater unless it is applied in either Dry Lake or Valley or Eldorado lakebed, where deep percolation is not possible. (Hoffman - North Carolina)
W74-03118

FUNCTIONAL WATER AND SEWER REPORT,
Colorado School of Mines, Golden.
For primary bibliographic entry see Field 03D.
W74-03122

EPA READIES FARM ANTIPOLLUTION GUIDELINES.

Environmental Science and Technology, Vol 7, No 9, p 796-798, September, 1973. 2 fig, 1 photo.

Descriptors: *Agricultural runoff, *Feedlots, Surface runoff, Pesticides, Fertilizers, *Farm wastes, Leaching, Water pollution, Water quality control, Insecticides, DDT, Aerobic treatment, *Waste water treatment, Pollution abatement, Waste disposal.
Identifiers: *Non-point runoff, Land spreading, Anaerobic treatment, Debris basin.

EPA guidelines to control non-point runoff from farm sources, including animal wastes, fertilizers, and pesticides are anticipated. An average-size feedlot for 30,000 herd of cattle may produce the BOD equivalent to a city of 200,000 people and a total solids output equivalent to a city of 600,000. The animal waste problem has been compounded in recent years as the number of cattle confined to feedlots increased dramatically. Farmers lack incentive to fertilize with manure because inexpensive chemical fertilizers provide 20-100 times more nitrogen per unit weight than manure. The problem with chemical fertilizers is leaching of nitrates and phosphorus into waterways. Pesticides, too, leach into water. Speculation about new EPA-approved pest controls include virus-based insecticides which injure only target species, introduction of sterilized insects, use of sex-attractant chemicals, or introduction of natural enemies. Current innovation concerning animal waste control has focused upon anaerobic and aerobic biologically active systems, land-spreading of liquid and solid wastes, incineration, dehydration, and composting. Anaerobic and aerobic waste disposal systems are discussed in more detail including design of a recently developed debris basin and holding unit. Cost of treating feedlot runoff with an aerobic biological system could be as low as $.65 per head. The uncertain effects of spreading feedlot effluent on cropland are discussed. (Stein - North Carolina)
W74-03128

AN ECONOMIC FEASIBILITY STUDY OF FAYETTEVILLE, NORTH CAROLINA, TREATING FORT BRAGG'S WASTEWATER,
Army Construction Engineering Research Lab., Champaign, Ill.
D. Nelson, and J. E. Matherly.
Technical Report E-9, March 1973. 21 p, 10 tab, 7 ref, 5 append.

Descriptors: *Waste water treatment, *Treatment facilities, *Economic feasibility, Waste treatment, Tertiary treatment, Estimated costs, Capital costs, Pumping plants, Water quality standards, *Operating costs, *North Carolina.
Identifiers: Fort Bragg (NC), Fayetteville (NC).

The economic feasibility of Ft. Bragg, North Carolina, entering into a cooperative waste water treatment system with the Fayetteville, North Carolina, Public Works Commission was evaluated. Ft. Bragg currently uses trickling filters for secondary treatment yielding 80-85% removal of BOD and suspended solids (SS). The estimated future standards of 15 mg/l for BOD and 10 mg/l SS will therefore require drastic changes in Ft. Bragg's existing plant. It also faces immediate problems with untreated wastes and filter backwash wastes being discharged directly into the Little River. For Ft. Bragg to continue treating its 4.7 million gallons, three pumping stations must be replaced and an activated sludge plant with tertiary filtration and chlorination must be added. Alternatively, Fayetteville treatment will require several new pumping stations. An analysis of operating and maintenance costs and amortized capital costs indicates that the yearly cost to the government for Ft. Bragg treating its own wastes is $650,000; for Fayetteville treating all waste water - $806,000; and for Fayetteville treating the gravity portion of Ft. Bragg's waste - $716,000 (under existing terms). The analysis reveals it will be best if Ft. Bragg continues and improves treatment of its own waste water. (Schroeder-Wisconsin)
W74-03187

REUSE IRRIGATION CUTS COSTS,
Nebraska Univ., Lincoln.
P. E. Fishbach.
Ground Water Age, Vol 6, No 12, p 26-27 and 35, 1972.

Descriptors: *Water reuse, *Irrigation water, *Recirculated water, Irrigation systems, Irrigation practices, *Recycling, Benefits, Fertilizers, *Return flow.

Up to 40% of total irrigation water losses may be due to runoff. A reuse system which can reduce nearly all of this runoff is described. The system consists of drains to intercept and carry the runoff to storage reservoirs; a pump, a power unit, and controls; and pipes to convey the water back to the irrigation system. Benefits arising from the reuse system include savings in water and irrigation labor, weed control, and reduction in possible pollution effects arising runoff. (Schroeder-Wisconsin)
W74-03194

5E. Ultimate Disposal of Wastes

DISPOSAL OF BRINE INTO AN ESTUARY,
Camp, Dresser and McKee, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 05B.
W74-02735

SOLIDS WASTE DISPOSAL.
Montgomery County Sanitary Dept., Dayton, Ohio.
For primary bibliographic entry see Field 05D.
W74-02840

APPLICATION AND OPERATION OF SLUDGE INCINERATION,
Saint Louis Metropolitan Sewer District, Mo.
P. E. Wieting, and G. R. Schillinger.
1973. 40 P, 15 FIG.

Descriptors: *Sludge disposal, *Incineration, *Sewage sludge, *Solid wastes, *Operation and maintenance, Treatment facilities, Environmental sanitation, Sanitary engineering, Sewage districts, Sludge treatment.
Identifiers: *Multiple hearth furnance, *St. Louis (Missouri), Volume reduction.

The Metropolitan St. Louis Sewer District uses the incineration process to dispose of solids in sewage sludge at two local plants which provide primary treatment of waste water. The primary advantages of the sludge incineration process is volume reduction and solids sterilization. By proper design and operation, the incineration facilities at St. Lous are utilizing these features. The operation of the multiple hearth furnace has been satisfactory and has adequately served their design purpose. The more important operational parameters are discussed. These items must be considered in the design of the overall solids handling program. Particular attention should be given to the method of dewatering the sludge. This is of a more critical consideration when waste biological sludges must be destoryed. Incineration is being adopted by many municipalities and industries. Therefore, the multiple hearth units will be installed at more locations. Some improvement in the design and operation would be desirable, even though the present units operate satisfactorily. Recovery of heat offers one potential way of improving the economy of incineration. A search of new designs to accomplish this is advisable as the heat might possibly be used to condition the sludge for incineration. Development of additional instrumentation to control the combustion process and development of some beneficial use for the ash, perhaps as an aid to sludge conditioning, would be advisable. (Poertner)
W74-02849

THERMOLYTIC SEWAGE SYSTEM,
For primary bibliographic entry see Field 05D.
W74-03001

5F. Water Treatment and Quality Alteration

DESIGN OPTIMIZATION FOR BIOLOGICAL FILTER MODELS,
Northwestern Univ., Evanston, Ill. Technological Inst.
For primary bibliographic entry see Field 05D.
W74-02679

CONSERVATION OF WATER RESOURCES AND THEIR RATIONAL USE IN THE NATIONAL ECONOMY (OKHRANA VODNYKH RESURSOV I IKH RATSIONAL'NOYE ISPOL'ZOVANIYE V NARODNOM KHOZYAYSTVE),
For primary bibliographic entry see Field 05D.
W74-02749

SEWERAGE FACILITIES PLAN, IN ACCORDANCE WITH THE PENNSYLVANIA SEWERAGE ACT (537).
Delaware County Planning Commission, Media, Pa.
For primary bibliographic entry see Field 05D.
W74-02832

WATER SUPPLY AND SEWAGE FACILITIES PLAN UPDATE--1970, LEHIGH-NORTHAMPTON COUNTIES, PENNSYLVANIA.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05D.
W74-02848

THE DENVER SYSTEM OF CONTROLS,
Denver Water Dept., Colo.
C. E. C. Carlson.
Paper presented at the Annual Meeting of the American Water Works Association, Denver, Colorado, June 17, 1971. 9 p.

Descriptors: *Water distribution (Applied), *Water supply, *Automatic control, *Instrumentation, *Remote control, Pumping, Control systems, Distribution systems, Water delivery, Water pressure, Utilities, Colorado.
Identifiers: *Denver (Colorado).

Situated in the South Platte River Valley, Denver has grown up the slopes of the Valley, necessitating considerable pumping of water. As of 1971, the

City had 26 pump stations and 23 pressure zones, and more than 50 percent of all water supplied was pumped. Rapid growth of the area has demanded control of the pumping system. Prior to the installation of a good control system, numerous breaks occurred in the water mains. Centralized control was begun in 1947 and automatic or remote control of all pumps is now in effect. Three goals have been established for the use of controls: (1) to avoid low pressure and inadequate supplies of water, (2) to conserve water and power, and (3) to improve overall plant efficiency. Using a three-phase program, the control of the water distribution system focused first on reducing power consumption and later on the use of computers to operate the system. A fourth stage of incorporating the water treatment plants (some located as far as 150 miles from the City) into the system is envisioned. It was discovered very early in the program that a single manufacturer of equipment should be used to reduce costs and obtain maximum compatibility of system components. (Poertner)
W74-02854

INDUSTRIAL AND HIGH VELOCITY METERING,
Philadelphia Water Dept., Pa.
A. J. Udstuen.
Paper presented at the American Water Works Association Annual Conference, Denver, Colorado, June 14, 1971. 5 p.

Descriptors: *Water measurement, *Flow measurement, *Utilities, *Reviews, Industrial water, Industrial plants, Water consumption, Flow rates, Flow-meters, Instrumentation, High flow, Measurement, Pennsylvania.
Identifiers: Philadelphia.

Water meters for industrial users are quite important and deserve special consideration in installation, sizing, maintenance and type selection. The rates of flow should be studied in a specific application and the most efficient meter matched to the particular flows present. High velocity flows are particularly troublesome as they impose excessive wear on underdesigned meters; such flows require special meters for satisfactory long-term operation. Three types of meters are suitable for high velocity flow: (1) propeller, (2) magnetic, and (3) turbine. Propeller meters are the simplest. They have a low head loss and are easily repaired. Because such meters are of rugged construction, high velocity flows of 10 feet per second do not cause damage. Propeller meters offer an easy solution to applications in situations where low flow rates are unusual and high, varying flow rates are normal. Magnetic flow meters operate on an application of Faraday's Law--i.e., higher flow rates producing higher voltages. Having a zero theoretical head loss due to the freedom from internal obstructions, this type of meter needs a continuous source of power. Seventy watts are required for a 6-inch meter which can measure flows of one to 30 feet a minute, or 90 to 2,700 gpm. Because it is satisfactory for use under extreme operating conditions, it can be an ideal meter for industrial demands. Turbine meters are similar to propeller meters, but the blades are mounted on a horizontal axis, thereby reducing the head loss. Because the turbine wheel has a specific gravity of nearly one, it is sensitive to low flow rates. (Poertner)
W74-02858

DETERMINATION OF POLYACRYLAMIDE IN THE DRINKING WATER BY MEANS OF AN ADSORPTION PHOTOMETRIC METHOD, (IN RUSSIAN),
For primary bibliographic entry see Field 05A.
W74-02932

IRON REMOVAL FILTER SYSTEM,
Red Jacket Mfg. Co., Davenport, Iowa. (Assignee).
K. D. Jarr, J. K. Baker, D. E. Ufford, E. M. Deters, and J. J. Hamann.
U.S. Patent No 3,762,550, 7 p, 4 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 159, October 2, 1973.

Descriptors: *Patents, *Iron, *Manganese, *Hydrogen sulfide, Oxidation, *Filtration, Metals, *Zeolites, *Water treatment, Pollution abatement, Water pollution control, *Water softening.

Iron, manganese and hydrogen sulfide can be removed from water by oxidizing the same to insoluble form, which can then be removed by filtering. The system includes a filter tank containing a bed of manganese greensand or manganese zeolite iron removal mineral, and an aspirator. A flow control valve is connected to the aspirator and to the filter tank to control the various flows of water to and from the filter tank and aspirator in the different stages of a regeneration cycle. The regenerant feed system includes a regenerant feeder tank sealed from the atmosphere to receive and store a quantity of potassium permanganate crystals sufficient for a number of regenerations of the bed of iron removal material, and a water measuring tank which is vented to the atmosphere. (Sinha-OEIS)
W74-03002

EVALUATION OF THE TENNESSEE WATER SUPPLY PROGRAM, SUMMARY.
Environmental Protection Agency, Atlanta, Ga. Bureau of Water Hygiene.
For primary bibliographic entry see Field 05G.
W74-03158

5G. Water Quality Control

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION,
Delaware Univ., Newark. Div. of Urban Affairs.
For primary bibliographic entry see Field 06B.
W74-02654

MODEL FOR LANDSCAPE RESOURCE ASSESSMENT, PART I OF THE 'METROPOLITAN LANDSCAPE PLANNING MODEL' (METLAND),
Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional Planning.
For primary bibliographic entry see Field 06B.
W74-02657

MODELING AND MANAGEMENT OF WATER AND RELATED LAND RESOURCES FOR PHOSPHORUS CONTROL AND ECOLIBRIUM,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Systems Engineering.
For primary bibliographic entry see Field 05B.
W74-02675

OPTIMAL CONTROL OF NITROGEN LOSSES FROM LAND DISPOSAL AREAS,
Cornell Univ., Itaca, N.Y.
For primary bibliographic entry see Field 05B.
W74-02677

NEW SIMULATION APPROACHES TO THE MODELING OF ENVIRONMENTAL SYSTEMS,
California Univ., Los Angeles. Dept. of Computer Science.
For primary bibliographic entry see Field 06A.
W74-02684

THE POLLUTION POTENTIAL IN PESTICIDE MANUFACTURING.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 05C.
W74-02685

ROTENONE METHODS IN A LARGE RIVER SYSTEM,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 08I.
W74-02736

IMPLEMENTATION OF THE FEDERAL WATER POLLUTION CONTROL ACT.
For primary bibliographic entry see Field 06E.
W74-02782

THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972: AMBIGUITY AS A CONTROL DEVICE,
For primary bibliographic entry see Field 06E.
W74-02784

THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972.
For primary bibliographic entry see Field 06E.
W74-02785

MISSOURI CLEAN WATER LAW.
For primary bibliographic entry see Field 06E.
W74-02787

WATER POLLUTION--THE TENNESSEE RESPONSE; CONCLUSIONS AND GENERALIZATIONS,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 06E.
W74-02794

FEDERAL LEGISLATION REGARDING MARINE POLLUTION,
For primary bibliographic entry see Field 06E.
W74-02795

CIVIL LIABILITY OF SHIPOWNERS FOR OIL POLLUTION,
For primary bibliographic entry see Field 06E.
W74-02796

MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972.
For primary bibliographic entry see Field 06E.
W74-02797

THE PROPOSED INTERNATIONAL COMPENSATION FUND FOR OIL POLLUTION DAMAGE,
For primary bibliographic entry see Field 06E.
W74-02799

HARTHMAN V. WITTY (APPEAL FROM DISTRICT COURT ORDER DENYING MOTION FOR ASSESSMENT OF DAMAGES AGAINST SHOPPING CENTER FOR VIOLATION OF INJUNCTION AGAINST POLLUTION OF STREAM).
For primary bibliographic entry see Field 06E.
W74-02809

U.S. V. VALLEY CAMP COAL COMPANY (VIOLATION OF FEDERAL STATUTE PROHIBITING DISCHARGE OF REFUSE MATTER INTO NAVIGABLE WATERS).
For primary bibliographic entry see Field 06E.
W74-02810

UNITED STATES V. KENTLAND-ELKHORN COAL CORPORATION (INJUNCTIVE RELIEF SOUGHT AGAINST DEFENDANT TO CAUSE CESSATION OF BLACKWATER DISCHARGE INTO FEDERALLY PROTECTED WATERS).
For primary bibliographic entry see Field 06E.

W74-02815

LAKE SKANEATELES--SEWAGE, GARBAGE DUMPING PROHIBITED.
For primary bibliographic entry see Field 06E.
W74-02817

NORTH GEORGIA PETROLEUM COMPANY V. LEWIS (ACTION BY PROPERTY OWNER SEEKING DAMAGES FOR POLLUTION OF WATER SUPPLY AND BY STATION OPERATOR AGAINST GASOLINE COMPANY FOR LOSS OF PROFITS).
For primary bibliographic entry see Field 06E.
W74-02818

DISPOSAL OF WASTE MATERIALS AT SEA.
For primary bibliographic entry see Field 06E.
W74-02819

A METHODOLOGY FOR ASSESSING ENVIRONMENTAL IMPACT OF WATER RESOURCES DEVELOPMENT.
Environmental Impact Center, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 06B.
W74-02822

WATER QUALITY MANAGEMENT: NEW JERSEY'S VANISHING OPTIONS.
New Jersey County and Municipal Government Study Commission, Trenton.

Eighth Report. June, 1973. 103 p, 1 map, 21 tab.

Descriptors: *Planning, *Legislation, *Institutions, Water quality, Administration, Governments, Management, Water resources, Financing, Monitoring, *New Jersey.
Identifiers: *Water quality management.

Since state government plays a key role in water management functions the report looks at all levels of government in relation to water quality management. The basic recommendation is that the State should enact strong, comprehensive legislation which establish a well defined intergovernmental institutional arrangement. Three specific areas of concern are emphasized: the need to empower local governments and the State Department of Environmental Protection (DEP) to carry out tasks mandated by Federal legislation; the need to firmly establish the function of the State DEP; and the need to define the basic role of all levels of government. A second recommednation is that there must be more emphasis on comprehensive water resource planning. Such planning is necessary to balance various goals and to serve as the basis for making important capital investment decisions. monitoring water quality, enforcement of water quality standards, and financing of water quality management programs are discussed. (Elfers - North Carolina)
W74-02841

A METHOD FOR INDUSTRIAL WASTE CONTROL AND SURCHARGE ASSESSMENT,
Saint Louis Metropolitan Sewer District, Mo.
For primary bibliographic entry see Field 06C.
W74-02850

AN OVERVIEW OF MARYLAND'S SEDIMENT CONTROL PROGRAM,
Maryland Dept. of Natural Resources, Annapolis. Water Resources Administration.
R. A. Kanerva.
Paper presented at the American Society of Civil Engineers, Annual Water Resources Meeting, Washington, D.C., January 29-February 2, 1973. 4 p, 3 ref.

Descriptors: *Maryland, *Sediment control, *Soil erosion, *Erosion control, *Water pollution control, Sedimentation, Surveys, Political aspects, Administration, Jurisdiction, Water pollution sources, Legal aspects, Non-structural alternatives, Soil conservation, Erosion, Legal aspects, Programs.

The State of Maryland has adopted a sediment control program. The necessity for such a program is realized by the facts of sedimentation, namely: (1) over one billion tons of sediment reach the nation's rivers annually, (2) sediment removal costs between 2 dollars and 3 dollars per ton, and (3) areas undergoing construction produce an estimated 50 to 500 times the amount of sediment that rural or forested areas produce. A typical urban construction site can yield 200 tons of sediment per acre per year. The Maryland sediment control program has had its roots in the declaration by the Maryland Attorney General's Office (in about 1961) that sediment is a water pollutant. In 1965, Montgomery County, Maryland became the first county in the United States to establish a sediment control program. In 1970, a state law was passed to establish a state-wide program centering on three general principles: (1) involvement of all levels of government and economic groups, (2) prevention of sedimentation by the control of erosion, and (3) flexibility of the plans to adjust to local situations. Although the program cannot be said to be an instant success, cooperation from public officials and consulting engineers, architects and builders has been cultivated through regional meetings. (Poertner)
W74-02852

ENGINEERING WORK LEADING TO A ROCK TUNNEL PLAN,
Greater Chicago Metropolitan Sanitary District, Ill.
For primary bibliographic entry see Field 08A.
W74-02853

4 WATER POLLUTION, ENVIRONMENTAL ENHANCEMENT STUDY.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.

September 1972. 135 p, 9 fig, 10 tab, 4 appendices. HUD Grant.

Descriptors: *Environmental control, *Environmental effects, *Water pollution control, *Water pollution sources, *Water pollution effects, Planning, Environmental engineering, Environmental sanitation, Pennsylvania, Organizations, Pollution abatement, Pollutant identification, Urbanization, Local governments, Regional analysis.
Identifiers: *Lehigh County (Pennsylvania), *Northampton County (Pennsylvania), Environmental enhancement.

Lehigh and Northampton Counties lie entirely within the Delaware River Drainage Basin which empties to Delaware Bay and then into the Atlantic Ocean below Cape May Point, New Jersey. This large watershed drains a 12,000-square-mile area that includes portions of five states: Pennsylvania, New York, New Jersey, Delaware, and Maryland. The main stem of the river, formed by the junction of the East and West Branches at Hancock, New York, is 375 miles long. Of the sixteen water service areas now functioning in Lehigh and Northampton Counties, three draw water from local surface waterways. Ground water reserves supply areas surrounding Allentown, Bethlehem and Easton in addition to providing one-fourth of the water requirements of Allentown and Bethlehem. Wells of springs provide the entire water supply in many other areas. The report includes identification of pollutants of surface and ground waters including industrial wastes, domestic wastes, leachates, oil wastes and sources of thermal pollution. Water pollution abatement activities of all levels of government are described and water quality standards and costs of pollution abatement are discussed. The groups and organizations that are working to improve water quality in the two-county region are identified. Various planning techniques are described briefly and local codes, ordinances and other pollution control methods are mentioned. (Poertner)
W74-02856

WATER USE FOR AQUATIC LIFE,
La Salle Coll., Philadelphia, Pa. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-02865

THE LEGAL AND REGULATORY FRAMEWORK FOR THERMAL DISCHARGE FROM NUCLEAR POWER PLANTS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
M. S. Baram.
Environmental Affairs, Vol 2, No 3, p 505-532, 1972. 3 fig, 59 ref.

Descriptors: *Long-term planning, *Decision making, *Regulations, *Nuclear powerplants, Electric power production, Thermal powerplants, Heated water, Effluents, *Thermal pollution, Air pollution, Water pollution, Environmental effects, Natural resources, Water quality control, Legal aspects, Legislation.

Thermal air and water effluents may have impact on the local and global environment and may affect economic and social conditions. These possible effects and resource demands have brought about actions by citizen groups which have resulted in a legal and regulatory framework for power-plant decision making, particularly as it relates to thermal pollution. A model for organizing information from diverse social, technical and legal sectors, to enable power plant decision makers to assess issues before siting and construction; and an outline of the evolving legal and regulatory framework for thermal water pollution are developed. In the model each project is evaluated on the basis of the various stages of development, including site selection and design, construction, pilot program and testing, and on-going operation. (Jerome-Vanderbilt)
W74-02875

SOME ASPECTS OF CHEMICAL CONTROL OF SOIL-BORNE PATHOGENS,
Plantenziektenkunde Dienst, Wageningen (Netherlands).
For primary bibliographic entry see Field 05B.
W74-02889

SUMMARY OF LEGISLATIVE AND REGULATORY ACTIVITIES AFFECTING THE ENVIRONMENTAL QUALITY OF NUCLEAR FACILITIES.

Nuclear Safety, Vol 12, No 6, p 665-678, Nov./Dec. 1971, 1 tab.

Descriptors: *Environment, *Nuclear power plants, *Legislation, *Regulations, *Legal aspects, Electrical power productions, Safety, Environmental engineering, Administration, Water quality, Operations research, Standards, Federal government, State government, Economics, Resources, Ecological distribution, Sites, Thermal pollution, Water temperature, Streams, Aquatic life.

Environmental information processed by the Nuclear Safety Information Center derived from official government sources is summarized to show the orderly development of intent and action in government. Particular attention is placed on legislation, executive action and those regulations

that are most immediately related to environmental quality. The summary information comprises: Legislation, adopted or pending; regulations, standards and executive orders issued or proposed; and state water-quality criteria. The legislative section is subdivided into nine topics covering: organization and authority; administrative procedure; economic incentives; research and information; control of discharges; energy; resources; legal procedures; and constitutional amendments.
W74-02890

DIFFERENTIAL TOLERANCE OF SIX LEGUMINOUS CROPS TO TERBUTRYNE,
Hebrew Univ., Rehovot (Israel). Dept. of Field and Vegetable Crops.
For primary bibliographic entry see Field 03F.
W74-02941

VEGETATIVE RESPONSE TO CHEMICAL CONTROL OF BROOM SNAKEWEED ON A BLUE GRAMA RANGE,
Wyoming Univ., Laramie. Div. of Plant Science.
For primary bibliographic entry see Field 04A.
W74-02943

PROCESSES, PROCEDURES, AND METHODS TO CONTROL POLLUTION RESULTING FROM SILVICULTURAL ACTIVITIES.
Environmental Protection Agency, Washington, D.C. Office of Air and Water Programs.

Copy available from GPO Sup Doc as EP1.23: 430-73-010; $1.25, microfiche, from NTIS as PB-226 658, $1.45. Environmental Protection Agency, Report EPA 430/9-73-010, October 1973. 91 p, 17 fig, 14 tab, 57 ref.

Descriptors: *Forest management, *Pollution abatement, Water pollution control, *Erosion control, *Reforestation, Thermal pollution, Sediment control, Forest fires, Organic matter, Mineralogy, Pesticides, Fertilizers, Solar radiation, Lumbering, Water pollution sources.
Identifiers: Fire retardant shemicals, *Lumber harvesting, Lumber transport, *Nonpoint pollution sources.

Nearly 203 million hectares (500 million acres) in the United States are in forests managed primarily for the production of timber. The principal water pollutants from this land area are eroded mineral soil sediments transported in runoff; organic matter which is chiefly transmitted to the water by runoff; pesticides; fertilizers, fire retardant chemicals; and thermal pollution resulting from solar radiation. Of these pollutants, sediment, including both its organic and inorganic (mineral soil) constituents, is the greatest single cause of water quality degradation. Sediment additionally acts as a carrier of such pollutants as pesticides and phosphorus. Control of erosion due to runoff is thus the most important aspect of control of pollution from forests. Pollution from forests is nonpoint in origin, and defies control of treatment in the conventional sense. The treatment and control methodology is, therefore, principally the forest management system--the combination of practices involved in harvesting trees; log transport; reforestation; protection from fire, disease, insects and weed trees; and growth promotion. The practices in current use require adaption to meet environmental goals as well as to achieve other objectives which govern forest land use. (EPA)
W74-02946

PETROLEUM SYSTEMS RELIABILITY ANALYSIS, VOLUME I - ENGINEERING REPORT, A PROGRAM FOR PREVENTION OF OIL SPILLS USING AN ENGINEERING APPROACH TO A STUDY OF OFFSHORE AND ONSHORE CRUDE OIL PETROLEUM SYSTEMS,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
J. E. Ritchie, Jr., F. J. Allen, Jr., R. M. Feltes, R. Q. Foote, and W. A. Shortt.
Copy available from GPO Sup Doc as EP1.23/2: 73-2802, $1.25; microfiche from NTIS as PB-226 584, $1.45. Environmental Protection Agency, Technology Series Report EPA-R2-73-280a, 82 p, 2 fig, 3 tab, 61 ref. EPA Project No 15080 HOC. Contract 68-01-0121.

Descriptors: Oil spills, *Oil pollution, Drill holes, *Water quality standards, Data collections, *Well data, *Pollution abatement, Water pollution control.
Identifiers: *Oil spill records.

EPA's oil spill prevention program has developed a methodology for evaluating Drilling, Production, and Gathering/Distribution Systems plans to prevent spillage of crude oil. The program respons to the Federal Water Pollution Control Act, as amended in 1972. The methodology has been designed for use by EPA Regional personnel, and to minimize requirements for the special skills of a petroleum engineer or systems analyst. The scope of the study included offshore and onshore facilities in the Gulf of Mexico, Louisiana, Texas, California, and Alaska. Field surveys providing firsthand observation of selected facilities are documented. Approximately 15,000 spill records were collected from 20 data sources coving major oil producing States. Half of these records were identified as being useful to the study and are included. The report presents, for use by EPA Regional personnel, a set of checklists which identify system points of spill vulnerability, and spill prevention guidelines applicable to these points. Application of these guidelines to a specific facility will require judgment and allow innovative spill prevention measures. (EPA)
W74-02947

METHOD AND APPARATUS FOR DETERMINING A FLUID CONTAMINANT,
Texaco, Inc., New York. (Assignee).
L. M. Hubby.
U. S. Patent No 3,763,706, 4 p, 1 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 443, October 9, 1973.

Descriptors: *Patents, *Separation techniques, *Oil pollution, *Sensors, Water quality control, *Pollution abatement, Water pollution control, *Offshore platforms.
Identifiers: Petroleum production.

The presence of a contaminant in a liquid stream is sensed by a U-tube connected to the stream with a fixed height outlet leg which senses the height of the inlet leg on the U-tube. A change in the inlet height is indicative of the presence of a contaminant. The invention is a combination of elements that are in use with petroleum production operations which have a platform structure located over or near a body of water. The structure includes a deck upon which oil may gather, and a drain for carrying off fluids from the deck. Means are provided for an alarm which is actuated when oil is present in fluid draining from the deck. (Sinha-OEIS)
W74-03000

FLOATING SKIMMER,
Watermaster Industries Ltd., London (Ontario). (Assignee).
A. J. Tudor, and E. E. Tudor.
U. S. Patent No 3,762,557, 3 p, 5 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 161, October 2, 1973.

Descriptors: *Patents, *Skimming, *Oil spills, *Oil pollution, Water pollution control, *Separation techniques, Water quality control, *Pollution abatement.

A skimmer comprises a floatable upper annular section. It has a central opening; a plurality of arch-shaped cut outs are formed in its underside. A lower section is dismountably secured to the underside of the upper section. The lower section includes a central receptacle having a conical or cylindrical truncated wall and a flange portion circumscribing the upper edge of the wall. The flange portion is coterminous with the annular section of the upper section. At least three flotation cylinders are mounted at three equally spaced locations. These are selectively adjustable to vary the height of the periphery of the skimmer floating about the liquid being skimmed. (Sinha-OEIS)
W74-03005

PROCESS OF REMOVING WATER FROM SLIMES,
American Cyanamid Co., Stamford, Conn. (Assignee).
C. C. Cook, and E. M. Haynsworth.
U. S. Patent No. 3,763,041, 10 p, 4 fig, 4 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 274, October 2, 1973.

Descriptors: *Patents, *Phosphates, *Phosphates, *Dewatering, Slime, *Pollution abatement, Mine water, *Waste disposal.
Identifiers: Tailings, *Rock processing.

A means is provided for eliminating the substantial waste disposal problems in disposing of slimes and tailings and, in particular, for eliminating the safety hazards as well as land and water pollution hazards. When slimes are admixed with tailings there is a substantial enhancement in the rate at which the water is released from the waste slimes of phosphate rock processing. Virtually useless slimes can be transformed into fertile soil having acceptable bearing strength so as to render such soil suitable for purposes of land reclamation and pollution control. (Sinha-OEIS)
W74-03007

MGCO3 ADDITION TO CASO4 CONTAINING SEA WATER TO PREVENT CORROSION,
For primary bibliographic entry see Field 03A.
W74-03010

APPARATUS,
Uniroyal, Inc., New York. (assignee)
G. J. Gauch.
U. S. Patent No. 3,766,738, 5 p, 3 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1213, October 23, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Barriers, Water quality control, Water pollution control, Equipment.
Identifiers: *Floating booms.

An apparatus is designed to support a floating boom which forms a barrier on the surface of a liquid and for forming a seal between the end of the boom and a fixed structure. The apparatus allows lateral and vertical displacement of the boom with changes of wind, current or tide. A deformable, resilient wall held in pressure contact with the dock while supported on a vertically and laterally movable frame displaceable along a vertical pipe spaced from the dock maintains the seal to prevent oil or other pollutants on the surface of the liquid from passing between the end of the boom and the dock. (Sinha-OEIS)
W74-03014

OIL SPILLAGE ENCLOSURE SYSTEM FOR MARINE USE,
G. J. MacLean.

U. S. Patent No. 3,766,739, 3 p, 8 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1214, October 23, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, Facilities, Transfer, *Ships, Water quality control, Water pollution control, *Pollution abatement.
Identifiers: Mooring facilities, Marine oil transfer facility.

An oil containment system is permanently attached to the transfer facility. It can be positioned by a single man utilizing a power assist. It consists of an enclosure system for containing floating material on a body of water between one side of a ship's hull and an adjacent mooring barrier comprising a pair of barriers expandable along the length and extending in height below and above the water surface. Each barrier has a bumper which engages with the hull of the vessel preventing oil from escaping between bumpers and the ship's hull. (Sinha-OEIS)
W74-03015

SKIMMER FOR A WATER BODY,
L. P. Flatland.
U. S. Patent No. 3,767,055, 3 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1295, October 23, 1973.

Descriptors: *Patents, *Skimming, *Flotsam, Screens, *Pollution abatement, Water quality control, Water pollution control.
Identifiers: Debris.

A skimmer includes a circular float fabricated of any light material, such as a foamed plastic. A frame, usually of light metal is adapted to be secured to the float by clips so that the frame and float can readily be separated. The frame in one portion is provided with a depressed yoke defining an opening or mouth between the frame and the float. Suspended from the frame and the yoke is a porous net or similar screen basket appropriately secured in place. The mesh size permits the basket readily to move through the water but is small enough to intercept debris such as leaves, twigs and other debris. The propulsion mechanism is mounted on the float and a rudder is connected to the float. A rotatable guard ring extends outward beyond the float to fend the float from obstacles and permit the float to turn away automatically. A decorative housing encloses much of the structure. (Sinha-OEIS)
W74-03017

SYSTEM FOR SURVELLANCE OF OCEAN DUMPING
Sperry Rand Corp., New York. (assignee)
P. J. Bizzigotti, and J. Charlton.
U. S. Patent No. 3,768,098, 4 p, 1 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1537, October 23, 1973.

Descriptors: *Patents, Oceans, *Waste disposal, *Water pollution control, Water quality control, *Pollution abatement.
Identifiers: *Ocean dumping, Loran signals.

A system for determining if ocean dumping of waste materials by licensed vessels occurs in other than assigned areas utilizes Loran receiving means for providing electrical signals indicative of the vessel's position. The Loran signals are applied to a recorder in which permanent records of the Loran signals are entered at specified times in response to Print Command signals from a command unit. The command unit contains a plurality of input switches which are actuated during the occurrence of specified events such as the beginning of an actual dump operation, to produce a Print Command signal and an identifying signal indicative of the particular switch that was actuated as well as a clock signal indicative of the time of occurrence of the recorded event. The resulting record of an entire voyage is suitable for submission to the licensing agency for their review. (Sinha-OEIS)
W74-03021

METHOD FOR SEPARATING OIL FROM WATER,
Minnesota Mining and Mfg. Co., St. Paul. (assignee)
W. E. Sohl.
U. S. Patent No. 3,764,527, 3 p, 8 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 639, October 9, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Separation techniques.
Identifiers: Hydrophobic fibers, Oleophilic fibers.

A method is designed for removing oil films and slicks from water surfaces as well as for removing emulsified or suspended oil from water. The substances are contacted by an oleophilic fibrous web which has a large number of interconnected interstitial voids into which the oil is received and retained to the exclusion of water. The fibers are hydrophobic and have a diameter size ranging between 0.1 micron and 100 microns. The fibrous web has a bulk density, expressed as a percentage of fiber density, in the range of 2 to 35 percent. Four examples are set forth. (Sinha-OEIS)
W74-03023

U. S. COAST GUARD OIL POLLUTION INVESTIGATION AND CONTROL SCHOOL, INVESTIGATOR'S MANUAL.
Coast Guard, Yorktown, Va.

Available from NTIS, Springfield, Va. 22151 as AD-758 510. Price $9.00 printed copy; $1.45 microfiche. Coast Guard Reserve Training Center, November 1972. 347 p.

Descriptors: *Oil pollution, *Oil spills, *Oil wastes, *Water pollution control, Training, Water Quality Act, Federal Government, Investigations, Photography, Path of pollutants, Ships, Harbors, Estuaries, Environmental control.
Identifiers: *Investigators manual, *Oil pollution handbook.

This manual was designed as a handbook for oil pollution investigators. The manual consists of 13 chapters: (1) The Laws of Water Pollution, (2) Knowing Discharge, (3) The Laws of Evidence, (4) The Miranda Case, (5) Tactics of Defendants, (6) Interviewing, (7) Report Writing, (8) Sample Pollution Report, (9) Oil Pollution Investigations, (10) Locating the Source of Oil Spills, (11) Photography, (12) Gathering Evidence: Sampling, and (13) Tanker/Terminal Transfer Operations. (Woodard-USGS)
W74-03027

MANAGING OUR COASTAL ZONE.

Available from NTIS, Springfield, Va. 22151 as COM-73-10735 Price $3.00 printed copy; $1.45 microfiche. Proceedings of Conference on Coastal Zone Management, February 20-21, 1973, Albany, N.Y.: New York State Sea Grant Program Publication, 1973. 78 p.

Descriptors: *Water resources development, *Coasts, *New York, *Conferences, State governments, Water quality, Water pollution, Environmental control, Electric power production, Land use, Conservation, Recreation facilities, Economics, Social aspects, Planning, Management.
Identifiers: *Coastal zone management, *Albany (NY), Symposium.

A conference on coastal zone management was sponsored by the New York State Sea Grant Program, February 20-21, 1973, in Albany, New York. Workshop topics included electrical energy production; water quality problems; resources--their conservation and utilization; environmental control--physical limitations; unique areas--problems of preservation; land use pressures and the coastal zone; recreation--public and private sectors; preparation and coordination of coastal zone plans; the coast as a public trust; the changing role of local governments; interstate and intrastate planning; economic implications of coastal zone management; and information and educational needs for coastal zone management. (Woodard-USGS)
W74-03037

NATIONAL ENVIRONMENTAL INFORMATION SYMPOSIUM: AN AGENDA FOR PROGRESS--PAPERS AND REPORTS, VOLUME 2.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-03040

ANNUAL REPORT, '71-'72.
Hawaii Univ., Honolulu. Water Resources Research Center.

Available from the National Technical Information Service as PB-226 659 $5.75 in paper copy, $1.45 in microfiche. Annual Progress report, 1973. 74 p. OWRR A-999-HI (8).

Descriptors: *Water pollution control, *Water management (Applied), *Water quality control, *Hawaii, Water reuse, Reviews, Water utilization, Water treatment, Irrigation water, Sewage treatment, Desalination, Data collections, Information retrieval, Water pollution sources, Model studies, Hydrologic data, Floods, Urban hydrology.

Water quality management is a leading issue confronting Hawaii's water resources. This report summarizes the projects in progress by the Water Resources Research Center at the University of Hawaii. The total program of the Center was marked by a sharp upswing in 1971-1972. The Office of Water Resources Research allotment and matching grant programs now account for about one-third of the Center's programs. The others include several major projects concerned with the solution of practical problems: quality of coastal waters, water recycling from sewage effluent, water quality data bank, and pumping well tests data analysis. Nearly all allotment projects are de facto matched by funds, services, and other participation contributed by water agencies in the state. (Woodard-USGS)
W74-03092

CLEARWATER COASTAL ZONE MANAGEMENT PLAN.
RMBR Planning/Design Group, Tampa, Fla.
For primary bibliographic entry see Field 02L.
W74-03116

ENVIRONMENTAL ASSESSMENT; POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY, ANNEX B.
VTN Nevada, Las Vegas; and Jones and Stokes Associates, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 05D.
W74-03118

EPA READIES FARM ANTIPOLLUTION GUIDELINES.
For primary bibliographic entry see Field 05D.
W74-03128

FOREST MANAGEMENT ON THE WATERSHED,
Portsmouth Water Dept., Va.
For primary bibliographic entry see Field 04C.
W74-03129

NEED TO IMPROVE ADMINISTRATION OF THE WATER POLLUTION RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.
General Accounting Office, Washington, D.C.

Report to the Congress, November 21, 1972. 49 p, 2 tab, 3 append.

Descriptors: *Water pollution control, *Administration, *Federal budget, Research, Research equipment, Research facilities, Laboratories, Administrative agencies, Governmental interrelations.

This report is made pursuant to the Budget and Accounting Act and the Accounting and Auditing Act. Because of the large amount of funds appropriated to the Environmental Protection Agency (EPA) for fiscal years 1956 through 1972, the General Accounting Office (GAO) examined EPA's administration of its demonstration grant program and its research grants and contracts, as well as utilization of its laboratory facilities and management of its research equipment. Included are recommendations to the EPA administrator, and suggestions for consideration by the Congress. EPA conducts the major federal water pollution control research program. (Sears-Florida)
W74-03131

AN INVENTORY OF ENVIRONMENTAL RESOURCES RESEARCH IN PROGRESS, COLORADO STATE UNIVERSITY.
Colorado State Univ., Fort Collins. Environmental Resources Center.
For primary bibliographic entry see Field 06G.
W74-03133

A BILL TO AMEND THE ACT OF MARCH 3, 1899, COMMONLY REFERRED TO AS THE REFUSE ACT RELATING TO THE ISSUANCE OF CERTAIN PERMITS.
For primary bibliographic entry see Field 06E.
W74-03134

PUMPED STORAGE DEVELOPMENT AND ITS ENVIRONMENTAL EFFECTS.
For primary bibliographic entry see Field 08B.
W74-03144

EVALUATION OF THE TENNESSEE WATER SUPPLY PROGRAM, SUMMARY.
Environmental Protection Agency, Atlanta, Ga. Bureau of Water Hygiene.

January, 1971, 23 p, 1 fig, 3 ref.

Descriptors: *Water quality, *Standards, *Regulation, *Water policy, Water pollution, Coliforms, *Tennessee.

An evaluation was conducted at the request of the Tennessee Department of Public Health to determine the effectiveness of the Tennessee Water Supply Program, and if necessary, to recommend such improvements as may be needed to assure safe, wholesome drinking water for the residents of Tennessee. A representative sample of public, semi-public, and individual water supplies was selected for study. The basic water supply Statute, regulations, and program policies were reviewed. The Water Supply Program's activities, responsiveness to water supply problems, and staffing were also examined. A two-day and a three-day waterworks operators training course were monitored, and reported water-borne disease outbreaks were studied. Additionally, many residents, waterworks personnel, municipal officials, health officials and others were interviewed. Bacteriological and treatment plant laboratories were surveyed and evaluated. Conclusions were that the Tennessee Water Supply Program is not providing the health evaluation and engineering services necessary to fulfill its responsbilities to protect the health of the citizens of Tennessee, and recommendations for upgrading the system were presented. (Hunt-NWWA)
W74-03158

THE UNIVERSITY AND PUBLIC POLICY IN WATER RESOURCES, PROCEEDINGS UCOWR ANNUAL MEETING HELD JULY 29-AUGUST 1, 1973 AT TEXAS TECH UNIVERSITY, LUBBOCK, TEXAS.
For primary bibliographic entry see Field 06B.
W74-03172

REGIONAL RESEARCH OPPORTUNITIES UNDER EPA SPONSORSHIP,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 06B.
W74-03176

SOCIAL AND ECONOMIC IMPACT ON URBAN AREAS OF 'WATER POLICIES FOR THE FUTURE,' THE NATIONAL WATER COMMISSION REPORT,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 06B.
W74-03177

WATER QUALITY ISSUES IN THE NATIONAL WATER COMMISSION'S REPORT 'WATER POLICIES FOR THE FUTURE',
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 06B.
W74-03179

HIGHLIGHTS AND ISSUES OF THE 1972 AMENDMENTS TO THE FEDERAL WATER POLLUTION CONTROL ACT,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 06B.
W74-03180

WATER RESOURCES POLICY ISSUES RELATED TO AGRICULTURE,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 06B.
W74-03182

A FORECASTING MODEL APPLIED TO POLLUTION CONTROL COSTS,
Chase Econometric Associates, Inc., New York.
M. K. Evans.
American Economic Review, Vol 63, No 2, p 244-256, 1973. 3 tab. EPA 68-01-0737.

Descriptors: *Mathematical models, *Pollution abatement, *Economic impact, Income analysis, Employment, Prices, Investment, Industrial production, *Forecasting, Environmental control.
Identifiers: *Econometric Models, Macroeconomics.

It has been estimated that $275 billion will have to be expended to clean up the environment for the remainder of this decade. The economic effect of pollution control at the macroeconomic and industrial levels is modeled. The process begins by calculating the percentage cost increases for each polluting industry using Environmental Protection Agency figures. These increases are translated into percentage prices increases using mark-up factors obtained from the Chase Econometric model. The increase in polluting industries' prices create repercussions throughout the economy which can be found using an input-output model. The prices determined so far are not market price changes. To calculate these, the above prices are converted to aggregate demand prices. The resultant values are multiplied by a second set of mark-up factors and entered into a macro model to calculate the dynamic effects and equilibrium and investment levels. The results suggest that, except for a substantial decline in the net foreign balance, no significant economic disruption occurs from increased pollution control. Prices rise 1-1/2 - 2% depending on the indicator used, with the largest increases coming in 1975-1976. GNP also declines by $4 billion in 1976 and $8.5 billion in 1977. Unemployment would be increased by 0.1 and 0.2% for the same years. (Schroeder-Wisconsin)
W74-03189

A STATE/LOCAL LAKE REHABILITATION PROGRAM: A PROPOSED BILL AND COMMENTARY,
Wisconsin Univ., Madison. Inland Lake Demonstration Project.
S. Born, J. Kusler, D. Yanggen, and J. Kurtz.
Report June 1973. 91 p. 1 tab, 26 ref.

Descriptors: *Legislation, *Wisconsin, *Water law, *Water quality control, *State governments, *Local governments, Lakes, Eutrophication, Sedimentation, Coordination, Regulation, Nonstructural alternatives, Watershed management, Land use, Financing, Governmental interrelations.
Identifiers: Joint state and local programs, *Lake rehabilitation, Lake protection.

A draft of a bill that has been introduced in the Wisconsin legislature establishing a joint state-local program for lake protection and rehabilitation is included and discussed. The program attacks the principal water quality problems associated with the accelerated aging of lakes: eutrophication, sedimentation, and contamination. These problems are aggravated by increased user demand for a relatively fixed supply of lakes. Two general approaches for the rehabilitation of eutrophic and other degraded lakes are: limiting fertility by restricting nutrient inputs and managing the consequences of over-fertilization. The best means to attack these problems exist in joint state and local efforts. The draft bill establishes an interagency lake protection and rehabilitation council to function at the state level, while a special district with powers limited to lake protection and rehabilitation, operates at the local level. The funding for these programs would be provided jointly by state and local governments, with a minimum local contribution of 10% of project costs. State revenues from licence fees, sales taxes on water related commodities, or state gasoline taxes, could provide funds for a state lake rehabilitation program. (Pinsky-Wisconsin)
W74-03196

PROBLEMS AND INSTRUMENTS RELATING TO THE ALLOCATION OF ENVIRONMENTAL COSTS.
Organization for Economic Co-Operation and Development, Paris (France). Water Management Section Group.
For primary bibliographic entry see Field 06B.
W74-03198

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

A STATISTICAL APPROACH TO DYNAMIC MODELING AND CONTROL OF WATER DISTRIBUTION SYSTEMS,
Polytechnic Inst. of Brooklyn, N.Y.
For primary bibliographic entry see Field 04A.
W74-02673

FLOOD CONTROL PROJECT PLANNING BY MATHEMATICAL PROGRAMMING: A PROJECT-EXPANSION APPROACH,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 04A.
W74-02674

MODELING AND MANAGEMENT OF WATER AND RELATED LAND RESOURCES FOR PHOSPHORUS CONTROL AND ECOLIBRIUM,
Case Western Reserve Univ., Cleveland, Ohio. Dept. of Systems Engineering.
For primary bibliographic entry see Field 05B.
W74-02675

CHANCE-CONSTRAINED MODEL OF SYSTEM OF RESERVOIRS,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 04A.
W74-02676

OPTIMAL CONTROL OF NITROGEN LOSSES FROM LAND DISPOSAL AREAS,
Cornell Univ., Itaca, N.Y.
For primary bibliographic entry see Field 05B.
W74-02677

MULTIGOAL WATER QUALITY PLANNING MODEL,
Krannert Graduate School of Industrial Administration, Lafayette, Ind.
For primary bibliographic entry see Field 05B.
W74-02678

DESIGN OPTIMIZATION FOR BIOLOGICAL FILTER MODELS,
Northwestern Univ., Evanston, Ill. Technological Inst.
For primary bibliographic entry see Field 05D.
W74-02679

FUNCTIONS TO PREDICT EFFECTS OF CROP WATER DEFICITS,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 03F.
W74-02680

COMPUTER SIMULATION FOR UPGRADING EXISTING WASTEWATER TREATMENT FACILITIES BY CHEMICAL PHYSICAL TREATMENT,
Envirotech Corp., Brisbane, Calif.
For primary bibliographic entry see Field 05D.
W74-02681

DEVELOPMENT OF A MARGINAL ANALYSIS CAPABILITY FOR WATER RESOURCES SIMULATION MODELS,
Cornell Univ., Ithaca, N.Y. Water Resources and Marine Sciences Center.
For primary bibliographic entry see Field 04A.
W74-02682

A WATER QUALITY SIMULATION MODEL,
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05B.
W74-02683

NEW SIMULATION APPROACHES TO THE MODELING OF ENVIRONMENTAL SYSTEMS,
California Univ., Los Angeles. Dept. of Computer Science.
W. J. Karplus.
In: Proceedings of the Summer Computer Simulation Conference, Montreal, P.Q., Canada, July 17-19, 1973. 2 p, 1 tab, 4 ref.

Descriptors: *Simulation analysis, *Digital computers, *Computer programs, Numerical analysis, Water pollution control, Aquifers, Air pollution, Thermal pollution, Land subsidence, Mathematical models, Systems analysis.
Identifiers: *Environmental systems, *Computer language.

Virtually all currently-used models of water and air resources systems are implemented as FORTRAN programs designed and optimized specifically for the field under study. This involves costly programming and debugging, making it difficult for the environmentalist to participate effectively in the model-building process. As in many other fields, a digital simulation language can help minimize the barrier between user and programmer. Recently, Digital Simulation Languages designed specifically for systems characterized by partial differential equations have proven useful in the simulation of field problems. For example, LEANS and PDEL were designed for simulating relatively small, well-behaved systems. In the case of environmental systems, the design of a useful simulation language is handicapped by the complexity and size of the fields being modeled. The approach described constitutes a preliminary effort to extend an existing and proven partial differential equation language (PDEL) to the environmental area. Success or failure in this effort will depend upon the magnitude of the penalty in terms of computing time, which will have to be paid for by the gain in user convenience and programming ease. (Bell-Cornell)
W74-02684

USE OF CENSORED DATA IN THE ESTIMATION OF GUMBEL DISTRIBUTION PARAMETERS FOR ANNUAL MAXIMUM FLOOD SERIES,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 02E.
W74-02763

ANALYSIS, MODELING AND FORECASTING OF STOCHASTIC WATER QUALITY SYSTEMS, VOLUME I, TIME SERIES ANALYSIS IN WATER QUALITY MODELING,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 05B.
W74-02823

ANALYSIS, MODELING AND FORECASTING OF STOCHASTIC WATER QUALITY SYSTEMS, VOLUME II, NONLINEAR FILTRATION AND ESTIMATION IN WATER QUALITY MODELING,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 05B.
W74-02824

REGIONAL PLANNING FOR SEWERAGE SYSTEMS,
Los Angeles County Sanitation District, Calif.
J. D. Parkhurst.
Paper presented at the American Society of Civil Engineers National Specialty Conference, 'Clean Water for Our Future Environment', Los Angeles, California, March 21-24, 1971. 11 p.

Descriptors: *Sewerage, *Regional analysis, *Comprehensive planning, *Sewage treatment, Municipal wastes, Industrial wastes, Water pollution control, California, Water pollution sources, Urbanization, Planning, Forecasting.
Identifiers: *Regional planning, *Multi-disciplinary studies.

Two major concepts being promoted in water pollution control--regional planning and multidisciplinary considerations--deserve more discussion on the local level then they have received to date. Both concepts are aimed to solve our modern day problems by transcending conventional political and academic boundaries. Because they require new ways of thinking, these concepts have been met with some resistance. Regional planning is a requirement for approval of federal grants for waste water treatment facility construction. Regionalization of sewerage service offers the following advantages: (1) broader bases for financing, (2) a comprehensive, uniform approach, (3) more varied alternatives, and (4) a more technically-capable staff. However, there are drawbacks to regionalization--including loss of political sensitivity and the promotion of undertakings contrary to the public wishes of all sectors. A multidisciplinary approach is needed because the modern day problems of pollution control are far too complex for all effects and side effects to be left to a single field of professionals. Specialists are needed in medicine, law, economics, chemistry, physics, public health, politics, wildlife management and engineering. Such an approach, used with regional planning is necessary for real success in pollution abatement; even with all these efforts, success will be difficult. (Poertner)
W74-02860

THE ECONOMIC EFFECTS OF FLOODS. INVESTIGATIONS OF A STOCHASTIC MODEL OF RATIONAL INVESTMENT BEHAVIOR IN THE FACE OF FLOODS,
Brown Univ., Providence, R.I. Dept. of Economics.
J. P. Brown.
Lecture Notes in Economics and Mathematical Systems, Vol 70. Springer-Verlag, New York 1972. 87 p. 13 fig, 66 ref.

Descriptors: *Floods, *Investment, *Stochastic processes, Risks, Land use, Flood plains, *Dynamic programming, Governments, Dams, Flood plain zoning, Insurance, *Economic impact, Simulation analysis, Flood protection.
Identifiers: Landowners, Bayesian approach.

The economic impact of floods is scrutinized as itaffects the choice of land use by a single landowner. The study makes several simplyfing assumptions; first that the landowner has a Von Neumann-Morgenstern utility function. It is also assumed that the available, mutually exclusive investment activities can be completely described by the stream of payments that they generate over time. It is finally assumed that floods are generated by a simple stochastic process, and that a flood destroys everything. Taking these assumptions under a known probability of flooding, dynamic programming models which identify the optimal investment strategy and replacement intervals are developed. When the probability of floods is unknown, a Bayesian approach is followed. In this case, the optimal program cannot simply be calculated but instead, bounds on the value of the program and some approximations and simplifications are suggested. A variety of government policies, dams, flood insurance, relief measures for flood victims, and flood plain zoning are analyzed when landowners behave as assumed in the study. A computer simulation program for simulating analysis of the Bayesian problem is described. (Pinsky-Wisconsin)
W74-03193

6B. Evaluation Process

RIVER: RECOMMENDATIONS FOR IMPROVING THE VALLEY ENVIRONMENTAL RESOURCES,
North Dakota State Univ., Fargo. Coll. of Engineering and Architecture.
O. S. Anderson, and M. L. Forthun.
Available from the National Technical Information Service as PB-226 628 $12.00 in paper copy, $1.45 in microfiche. Partial Completion Report WI-223-002-73, North Dakota Water Resources Research Institute, Fargo, December 1971. 158 p, 35 fig, 19 tab, 65 ref. OWRR C-2180-NDAK (no 3380) (1).

Descriptors: *Planning, *Water Management (Applied), *Administration, *River Basin Development, Land Resources, Environmental Effects, Water Resources Development, Valleys, Basins, *Land use, *Systems analysis, *North Dakota, Comprehensive planning.
Identifiers: *Red River of the North (N. Dak).

The main objective was to test the effectiveness and usefulness of the people oriented systems design approach as a viable technique for use in Water Resources planning. The program was designed to make optimum use of the water resources required for agriculture, industry and domestic uses within the Red River Basin. The systems approach used in this analysis is defined as a philosophical and methodological approach to find the solution to complex interdisciplinary problems. The steps involved in this process are: translation, analysis trade off and synthesis. A critical function of the systems approach philosophy is to provide a group with a set of ethically proper guidelines for group conduct. There were 21 faculty involved in the conduct of the research. The group developed four general recommendations. They included: (1) A comprehensive system of urban and rural land use planning should be developed. (2) The basin wide approach to planning should be carried out with local involvement. (3) An educational program for the public, leading to a better understanding of the problems and concepts of long and short term water resource management, is needed. (4) Careful study should be made before projects, which produce large scale environmental effects, are carried out. (See also W74-02652)
W74-02651

RIVER, RECOMMENDATIONS FOR IMPROVING THE VALLEY ENVIRONMENTAL RESOURCES, ADMINISTRATIVE REPORT,
North Dakota State Univ., Fargo. Coll. of Engineering and Architecture.
O. S. Anderson, and M. L. Forthun.
Available from the National Technical Information Service as PB-226 308 $3.00 in paper copy, $1.45 in microfiche. Final Completion Report, North Dakota Water Resources Research Institute, Fargo, July, 1973. 45 p, 5 fig. OWRR C-2180 (no 3380) (2).

Descriptors: *North Dakota, *Land use, *River basin development, *Administration, *Systems analysis, *Comprehensive planning, Planning, Water management (Applied), Environmental effects, River basin commissions, Optimum development plans, Regional development, Education.
Identifiers: Red River of the North (NDak).

The objectives were two fold; (1) a plan to produce guide lines and recommendations that will be useful to local regional, national and international agencies for River Basin studies. (2) provide information and expertise to develop interdisciplinary courses or programs. Both objectives were fulfilled. The voter and opinion makers must be considered in any type of contemplated project. The systems approach permits a number of ways to utilize such persons. The opinion maker can be either made a participant or used as a resource person. At least three student programs were run by faculty fellows in the academic year and one summer program which involved students and nonacademic people. The final evaluation of this program will not be available until several more years have passed because of the long-range objectives or the program. Implementation of the recommendations are necessarily political in nature. Thus, local, state, federal and international law and agreements will be necessary before most items can be implemented. In retrospect, an item lacking in this program was a provision for a follow-on program to encourage use of the recommendations. At the time, the group expected the Souris-Red-Rainy River Basin Commission to be continued with this objective in mind. (See also W74-02651)
W74-02652

A STUDY OF THE OPTIMAL MIX OF PRIVATE AND PUBLIC ACTION FOR LOCAL AND REGIONAL WATER CONSERVATION,
Delaware Univ., Newark. Div. of Urban Affairs.
R. F. Minnehan.
Available from the National Technical Information Service as PB-226 348 $2.00 in paper copy, $1.45 in microfiche. University of Delaware Water Resources Center Research Project Technical Completion Report, December 1973. 15 p. OWRR A-022-DEL (1). 14-31-0001-3808.

Descriptors: *Water conservation, Runoff, Flood control, Sewage treatment, Planning, *Delaware, Water policy, Alternative planning, Decision making.
Identifiers: New Castle County (Del.).

A set of local water resource problems were studied: upstream runoff control and downstream flooding, temporary sewage treatment plants, and choice of a regional waste water handling system. The study focus was on a preliminary test of four hypotheses about the process of design and decision-making. These hypotheses include: (H1) That for some situations a combination of privately and publicly constructed and financed conservation measures may be a more efficient choice than public actions alone and (H2) That the specific availability of funds and/or financing procedures may distort or bias the choice between alternative water conservation system. The other two hypotheses were derived from these. The policy implications of these hypotheses and their application to the case studies are discussed using verbal cost/benefit arguments to show why the hypotheses might be accepted. Some discussion of the general applicability of these hypotheses is presented.
W74-02654

MODEL FOR LANDSCAPE RESOURCE ASSESSMENT, PART I OF THE 'METROPOLITAN LANDSCAPE PLANNING MODEL' (METLAND),
Massachusetts Univ., Amherst. Dept. of Landscape Architecture and Regional Planning.
J. G. Fabos, R. Careaga, C. Greene, and S. Williston.
Available from the National Technical Information Service as PB-226 437 $4.75 in paper copy, $1.45 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication 30, Experiment Station Bulletin No. 602, 152, 1973, 32 fig, 26 tab, 120 ref, 3 append. OWRR-A-048-MASS (1). 14-31-0001-3521.

Descriptors: *Land use, *Regional analysis, *Regional development, *Resources development, *Statistical models, *Urbanization, Highway effects, *Massachusetts, Soil types, Suburban areas, Water quality, Water supply, Wildlife habitats.
Identifiers: *Boston metropolitan area, Agricultural productivity, Visual contrast, Visual diversity, Visual quality.

A model for landscape assessment was designed to estimate the losses that have resulted from post-World War II metropolitanization. Seven landscape resources variables and five subvariables were included in this study. These include water quality, water supply, agricultural productivity, wildlife productivity (open land, woodland, wetland), visual land use complexity (land use diversity and contrast), visual land use compatibility and amount of tree cover. Techniques to measure and rate the value of the variables using photogrammetric land use information and Soils Conservation Service information were developed. Three adjacent towns in the Boston metropolitan area were chosen as test sites. These sites were considered at two points in time, 1952 and 1971. The change in resource value was determined by comparing the value score for each variable for the two time frames. The results showed a negative change in resource value of the land as changes in land uses due to metropolitanization occurred. It was also found that when the visual diversity or contrast rating rose the compatibility rating decreased, thereby nullifying the positive change.
W74-02657

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO: UPPER RIO GRANDE,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
R. R. Lansford, S. Ben-David, T. G. Gebhardt, Jr., W. Brutsaert, and B. J. Creel.
Available from the National Technical Information Service as PB-226 326 $7.00 in paper copy, $1.45 in microfiche. New Mexico Water Resources Research Institute, Partial Technical Completion Report 021, 1973, 82 p, 12 fig, 33 tab, 1 append, 55 ref. OWRR A-045-NMEX (2).

Descriptors: *New Mexico, *Water demand, Economics, *Water resources development, *Economic prediction, Surface-groundwater relationships, Natural resources, Water requirements, Resource allocation, River basins, Groundwater management, Water law, Interstate compacts, International compacts, Treaties, Litigation, Water quality, *Water utilization, Human population, Employment, Industrial water, Recreation, Water management (Applied), Linear programming.
Identifiers: *Rio Grande Basin, Socioeconomic models, Groundwater appropriation, Input-output coefficients, Conjunctive use models, Economic land classification, Mathematical groundwater models, Irrigation water diversions.

An interdisciplinary approach to the solution of the water resource problems of the Upper Rio Grande region (URGR) in New Mexico was centered around a soci-economic model, with special emphasis placed upon the Rio Grande Region. Inputs into the socio-economic model were obtained from separate studies. Three sets of alternatives were considered: (1) Without a water constraint, in the Rio Grande Region, both production and depletions are expected to exhibit the largest increase (59.7 percent and 47.4 percent, respectively); (2) When a surface water constraint is imposed, the value of production is reduced by $18.1 million in 2020 and water depletions are expected to decrease about 18.1 percent by 2020; 3) When a total water constraint is imposed, the value of production is decreased $4.1 million below that expected when using only a surface water constraint, and water depletions reduced about 8.4 percent. The Upper Rio Grande Region is expected to follow the general trend of the total Rio Grande region but at a lower growth rate. The expected increase in total value of production from 1970 to 2020 is 53.8 percent, employment 53 percent, and water depletions about 20 percent. When a surface-water constraint is imposed, production is expected to be reduced $0.6 million in 2020, employment by 212 employees, and water depletions by 13,569 acre-feet. When a total constraint is imposed in the URGR, production is decreased $0.6

million in 2020, employment by an additional 212 employees, and water depletions by 13,497 acre-feet.
W74-02660

INVESTIGATION OF A NORTHEASTERN WISCONSIN LAKE ECOSYSTEM: AN INTERDISCIPLINARY APPROACH. PHASE II--MANAGEMENT PROBLEMS AND ALTERNATIVES,
Wisconsin Univ. Center, Marinette.
T. W. Thompson, A. J. Bedrosian, J. E. Berry, J. W. Kolka, and R. B. Ditton.
Available from the National Technical Information Service as PB-226 676 $3.00 in paper copy, $1.45 in microfiche. Wisconsin Water Resources Center, Madison Technical Report WIS-WRC-73-08, September 1973. 44 p, 4 fig, 1 tab, 19 ref. OWRR B-065-WIS (A).

Descriptors: *Attitudes, Economics, *Lakes, *Social aspects, Decision making, Watershed management, *Aquatic weeds, Environmental effects, *Wisconsin, *Rooted aquatic plants.
Identifiers: *Lake Noquebay (Wis), Caldron Falls Reservor (Wis), Marinette County (Wis), *Myriophyllum heteroplyllum.

Employing an interdisciplinary team approach, a recreational lake (Lake Noquebay) suffering from excessive growth of a rooted aquatic plant, Myriophyllum heterophyllum, new to Northeastern Wisconsin as a problem species, was studied over a three-year period. The plant appeared capable of regulating the nitrogen content of the lake's water and hence, controlling phytoplankton populations. However, its presence is detrimental to the recreational industry of the area and users indicate that they will avoid the lake should the problem intensify. The cause of the problem lies in the uncontrolled development of lowland areas surrounding the lake. Legal and political problems involved in the enforcement of the Wisconsin Shoreland Zoning Ordinance and in watershed management in Northeastern Wisconsin are analyzed and the importance of public education in developing political support for lake management programs is stressed. The approach adopted by the team and the conceptual model it employed are evaluated. Recommendations include that the talents present on two-year campuses throughout the state should be utilized more effectively in problem-oriented research, and that the Wisconsin Department of Natural Resources and the University of Wisconsin-Extension System assume ultimate responsibility for the management of recreational lakes in the State, assisted by citizens committees of the type developing at Lake Noquebay. (See also W74-07162)
W74-02662

ECONOMIC CRITERIA FOR DECISIONS ON PRESERVATION AND ALTERATION OF NATURAL RESOURCES WITH SPECIFIC REFERENCE TO FRESHWATER WETLANDS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
T. R. Gupta.
Available from the National Technical Information Service as PB-226 440, $15.75 in paper copy, $1.45 in microfiche. Ph.D. Dissertation, August 1973. 260 p, 1 fig, 15 tab, 320 ref. B-012-MASS (4) and OWRR B-023-MASS (8) 14-31-0001-3596.

Descriptors: *Wetlands, *Economics, *Wildlife, *Aesthetics, *Flood control, *Evaluation, Northeast U.S., *Massachusetts.

Institutional forces such as laws, ownership costs and taxes, goals and plans of owners which affect wetland usage are described. Methods are given for valuing inland wetland benefits and opportunity costs and for determining the general magnitude of these values. Generally applicable criteria for making decisions for issuance of wetland alteration permits are presented. A range of wetland values was determined based on Massachusetts wetlands, with trade-off prices ranging from $500 to $60,000 per acre. (Larson-Massachusetts)
W74-02671

FLOOD CONTROL PROJECT PLANNING BY MATHEMATICAL PROGRAMMING: A PROJECT-EXPANSION APPROACH,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 04A.
W74-02674

PA MONG STAGE ONE FEASIBILITY REPORT. APPENDIX VI. ECONOMIC, AGRICULTURAL, SOCIAL AND FINANCIAL ANALYSIS.
Bureau of Reclamation, Washington, D.C.

Available from the National Technical Information Service as PB-207 611, $6.00 in paper copy, $1.45 in microfiche. Agency for International Development, Washington, D.C., Report No TA/OST-AN-70-14-9, 1970. 506 p, 40 fig, 110 tab, 14 photos, 4 append.

Descriptors: *River basin development, *Asia, *Economic impact, Project feasibility, Data collections, Multi-purpose project, Benefit-cost analysis, Agriculture, Social change, Irrigation, Hydroelectric power, Benefits, Social impact.
Identifiers: *Mekong River (Pa Mong Project), *Laos, *Thailand, Economic analysis.

The general social, economic and historical background is reviewed. Water resources development is needed in the predominantly agricultural economy east of the Phu Phan Ridge including the Vientiane Plain of Laos and most of northeast Thailand north of the Chi River. The Pa Mong Project is located on the Mekong River where it forms the boundary between northern and northeast Thailand and the northwest part of Laos. A detailed review of the economy, its resources and stage in development provides a foundation for extensive discussion and analysis of both the macrol and microeconomic as well as the social impact of the project's development. Benefit-cost analysis specifically describes the feasibility of the project. Benefit-cost ratios, internal rates of return and project payout studies are considered only in the context of the social and economic setting, problems and needs of the area, present and potential patterns of resource use, and the wide range of multiple purposes, economic impacts, and social considerations described. Thus, the analysis admits to being indicative rather than conclusive in making decisions on water resource and economic development programs in the area. (See also W74-02687) (Weaver-Wisconsin)
W74-02686

PA MONG STATE ONE FEASIBILITY REPORT. APPENDIX VII. COROLLARY STUDIES.
Bureau of Reclamation, Washington, D.C.

Available from the National Technical Information Service as PB-207 612, $6.00 in paper copy, $1.45 in microfiche. Agency for International Development, Washington, D.C., Report No TA/OST-AN-70-14-10, 1970. 515 p, 36 fig, 148 tab, 28 ref.

Descriptors: *River basin development, *Asia, *Feasibility studies, *Project planning, *Investigations, Reservoirs, Data collections, Fisheries, Recreation, Boundaries (Property), Navigation, Flood control, Benefits, Forests, Mineralogy, Social impact, Social adjustment, Water requirements, Wildlife, Archaeology, Public health.
Identifiers: *Mekong River (Pa Mong Project), *Laos, *Thailand, People evacuation, Population resettlement.

Studies in many disciplines are presented which introduce complexities and challenges associated with the development of the Pa Mong water resources development project in Southeast Asia. Impacts and benefits of the project studied include: fisheries, recreation, public health, navigation, and flood control. A reservoir cadastral survey for Laos and specific discussions of evacuation of people from flooded areas are presented. Provincial, rural and industrial water consumption requirements were surveyed. A study of mineral resources in the area upstream from Pa Mong found no significant developed minerals, although the project was expected to enhance the value of iron, copper and manganese deposits. The project's impact on wildlife and forest resources is also reviewed. Also investigated was the effect of the project on the area's archaeology. (See also W74-02686) (Weaver-Wisconsin)
W74-02687

ALL-UNION CONFERENCE ON USE AND CONSERVATION OF WATER RESOURCES (VSESOYUZNOYE SOVESHCHANIYE PO ISPOL'ZOVANIYU I OKHRANE VODNYKH RESURSOV),
Yu. P. Belichenko, and Yu. I. Alekseyev.
Gidrotekhnika i Melioratsiya, No 7, p 119-121, July 1973.

Descriptors: *Conferences, *Water resources, *Water utilization, *Water conservation, Water management (Applied), Water pollution, Water treatment, Inspection.
Identifiers: *USSR.

An All-Union conference on use and conservation of water resources was held in Ul'yanovsk, April 9-10, 1973. Conference participants included 263 representatives from water-use and conservation agencies, Union ministries, scientific research institutes, and from enterprises and organizations in Ul'yanovsk and Ul'yanovsk Oblast. Subjects discussed included measures for increased conservation and improved use of natural resources; progress of state water inspections in the Ukraine; water management in the Kazakh Republic; water conservation measures in Krasnodar and Stavropol' Territories; recent scientific and technical achievements in industrial wastewater treatment; protection of natural waters from depletion and contamination; and protection of groundwater from pollution. (Josefson-USGS)
W74-02748

CONSERVATION OF WATER RESOURCES AND THEIR RATIONAL USE IN THE NATIONAL ECONOMY (OKHRANA VODNYKH RESURSOV I IKH RATSIONAL'NOYE ISPOL'ZOVANIYE V NARODNOM KHOZYAYSTVE),
For primary bibliographic entry see Field 05D.
W74-02749

WATER MANAGEMENT IN FINLAND (VODNOYE KHOZYAYSTVO FINLYANDII),
Politekhnicheskii Institut, Leningrad (USSR).
N. V. Zarubayev.
Gidrotekhnika i Melioratsiya, No 7, p 108-112, July 1973. 3 fig, 2 tab.

Descriptors: *Water management (Applied), *Water resources, *Water utilization, *Water supply, *Administration, Administrative agencies, Education, Schools (Education), Training, Professional personnel.
Identifiers: *USSR, *Finland.

Average annual precipitation in southwestern Finland is 650 mm and in regions above the Arctic Circle it is 400 mm. Average annual evaporation varies between 350 mm in the south to 150 mm in the north. Specific discharge of water varies between 7 and 11 liters/sec/sq km. Annual runoff of all Finnish rivers is about 110 cu km, of which 100 cu km

flows into the Baltic Sea and 10 cu km into the Arctic Ocean. Depending on the geographical location of individual regions and population density, per capita water supply varies between 3,000 and 22,000 cu m/yr. There are about 60,000 lakes in the country and their total volume is 200 cu km. Water pollution is especially widespread in heavily populated regions of the south and in areas of development of the paper and woodworking industries. According to rough estimates, total usable groundwater yield is 40 cu m/sec. The most abundant aquifers are confined to glacial deposits in the south. In 1971 water use in the country reached 90 cu m/sec, of which 65 cu m/sec was used in the woodworking industry, 15 cu m/sec in other related industries, and 9 cu m/sec for community water supplies. Seventy percent of community water supplies are derived from surface waters and 30% from groundwater. Average use rate in cities is 300 liters/day. Potential hydropower of Finnish rivers is estimated at 18 billion kwhr annually, and present production is over 11 billion kwhr. There are approximately 150 hydroelectric plants in the country, of which 43 have a capacity of over 10 Mw. Regulation of water use and training of hydraulic engineers at Helsinki Institute of Technology are discussed. (Josefson-USGS)
W74-02754

HYDROGRAPHY AND WATER RESOURCES OF AUSTRALIA (GIDROGRAFIYA I VODNYYE RESURSY AVSTRALII),
T. Ye Grigorkina.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 105, No 4, p 339-343, July-August 1973. 1 fig, 2 tab, 11 ref.

Descriptors: *Australia, *Water resources, *Hydrography, Surface waters, Runoff, Stations, Gaging stations, Measurement.
Identifiers: *USSR, Hydrometric stations.

To assess Australia's water resources, the continent was divided into 12 drainage divisions: North-East Coast, South-East Coast, Tasmanian, Murray-Darling, South Australian Gulf, South-West Coast, Indian Ocean, Timor Sea, Gulf of Carpentaria, Lake Eyre, Bulloo-Bancannia, and Western Plateau. According to data published by the Department of National Development for the Australian Water Resources Council, the total number of stations in Australia is 3,534, of which 3,047 are hydrometric stations (772 closed, the remainder in operation) and 487 are stage-measurement stations (of which 24 are closed). The number of hydrometric stations in operation has increased from 1.439 in 1963 to 2,275 in 1969 and is expected to reach 2,840 by 1974. On the average in Australia there is one hydrometric station for each 3,377 sq km. The length of record at 1,720 stations (49% of the total number) is 1 to 9 years. The length of record at 590 stations (16.7%) is over 30 years and at 232 stations (6.6%) is over 50 years. Total surface-water resources of the continent are estimated at 280 million acre-feet (346 cu km). Volume of average annual runoff is 348.3 cu km. Average depth of annual runoff is 45.4 mm, and excluding Tasmania, is 39.5 mm. Water is abundant in regions of the north, northeast, and southeast coasts and in Tasmania. These regions comprise 25% of Australia and have 87% of all water resources (303 cu km). Average depth of runoff in these regions is 154 mm. Arid regions comprise 60% of the continent and have only 4% of the water resources. The depth of runoff in the arid zone is less than 10 mm. (Josefson-USGS)
W74-02757

A METHODOLOGY FOR ASSESSING ENVIRONMENTAL IMPACT OF WATER RESOURCES DEVELOPMENT.
Environmental Impact Center, Inc., Cambridge, Mass.
Available from the National Technical Information Service as PB-226 545 $4.75 in paper copy, $1.45 in microfiche. Final Report, November 1973, 148 p, 32 fig, 19 tab, append. OWRR C-4324 (no9048) (1).

Descriptors: *Evaluation, *Environmental effects, *Water resources development, *Simulation analysis, *Computer models, Economic impact, Social impact, Land use, Recreation, Water pollution effects, Runoff, Aquatic environment, Ecosystems, Biology, Water supply, Urbanization.
Identifiers: *Connecticut River Basin, System dynamics.

Environmental impacts of water resource projects are assessed with a dynamic simulation model. The model consists of modular sectors that forecast regional population and industry, intra-regional land use patterns, and recreational activities. These are linked to a water sector which models stream flows, water supply withdrawals and consumption, and water quality in terms of dissolved oxygen and carbonaceous and nitrogenous oxygen demand. Evaluation of water quality includes effects of point sources, domestic or industrial, and dispersed source wastes from urban runoff. Biological activities, including algal concentrations and fish populations, are modeled separately. The model was applied to the Connecticut River Basin. Forecasts of regional population, industrial growth, gross land use patterns, and their impact on stream water quality were generated. Multi-objective water resource projects could be evaluated through projections of recreational water use, flood plain development, and water quality impacts of flow augmentation. The model can be used to test alternative plans and policies for water resource projects and to identify both direct and indirect environmental impacts.
W74-02822

THE EFFECTS OF AUTHORIZATION FOR WATER IMPOUNDMENTS ON SHORELAND TRANSITION,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
R. J. Burby, III, T. G. Donnelly, and S. F. Weiss.
Available from the National Technical Information Service as PB-226 553 $8.25 in paper copy, $1.45 in microfiche. University of North Carolina Water Resources Research Institute, Raleigh, Report No. 78, June 1973. 380 p, 1 fig, 69 tab, 118 ref, 3 append. OWRR B-025-NC (2), B-047-NC (2), and B-061-NC (1), 14-31-00001-3314, 3921, and 3625.

Descriptors: *Land development, *Land appraisals, Evaluation, Economics, Project planning, *North Carolina, Equity, *Land management, Land use, Impoundments, *Property values, Prices.
Identifiers: New Hope Reservoir (N.C.), Falls Reservoir (N.C.), Cape Fear River (N.C.), Neuse River (N.C.).

Escalation of real estate prices following reservoir authorization has become a serious problem in development of water resources and preservation of environmental quality. Land markets and land development are examined in two authorized federal reservoir areas in North Carolina including the transactional history of 7,018 land parcels within three miles of the reservoirs from points in time five and six years prior to authorization to five and six years after authorization. Factors associated with variation in market activity and sales prices and their policy implications are evaluated. Alternative federal, state, and local policies are proposed to reduce land acquisition costs, limit speculation, and maintain environmental quality. (Me Junkin-North Carolina)
W74-02826

REGIONAL WASTEWATER DEVELOPMENT PLAN, WATER QUALITY PLANNING.
Alamo Area Council of Governments, San Antonio, Tex.
For primary bibliographic entry see Field 05D.
W74-02830

COMPREHENSIVE WATER AND SEWER STUDY, HAMILTON, WALKER, AND CATOOSA COUNTIES, (BOOK TWO).
Hensley-Schmidt, Inc., Chattanooga, Tenn.
For primary bibliographic entry see Field 05D.
W74-02833

COMPREHENSIVE REGIONAL WATER AND SEWER SYSTEMS INVENTORY AND ANALYSIS,
Alabama-Tombigbee Rivers Regional Planning and Development Commission, Camden.
S. J. Smythe.
Report No. ALA-TOM 72-02, June, 1972. 123 p, 40 maps, 40 tab, 2 append.

Descriptors: *Planning, *Water supply, *Sewerage, Water quality control, Treatment facilities, *Comprehensive planning, Regional analysis, *Alabama.
Identifiers: *Utility systems inventory, *Alabama-Tombigbee Rivers Region.

An inventory and analysis is the first phase of a two-part comprehensive regional water and sewerage planning program for the 10 county Alabama-Tombigbee Rivers Regional Planning and Development commission region. A major problem in carrying out this program is the lack of data on existing systems and the lack of base maps. This problem stems largely from the fact that the region is quite rural and poor. The report is divded into three main sections: (1) a county-by-county description of physical features, population, and economic base; (2) an inventory and short analysis of each county's water supply systems including water sources, quantities, treatment, and distribution; and (3) an inventory and analysis of each county's sanitary sewerage systems including collection and disposal facilities, costs, and administration. The region has 44 water supply systems serving about 40% of the population and 18 sanitary sewerage systems serving about 30%. (Elfers - North Carolina)
W74-02837

WATER-RESOURCES PLANNING,
H. O. Banks, and J. O. Williams.
Journal of the American Water Works Association, Vol 65, No 11, p 665-669, November, 1973. 3 photos.

Descriptors: *Planning, *Water resources, *Water policy, Federal government, Alternative planning, Comprehensive planning.
Identifiers: *Water resources planning, *Water Resources Council, National Environmental Policy Act.

A report prepared for the National Commission by the Consulting Panel on Water Resources Planning is summarized. The overriding constraint on all sectors of public planning is the lack of clearly defined social, environmental, and economic goals on a national level. Equally constraining is the absence of a governmental vehicle capable of enlisting the entire spectrum of public planning agencies. If effective water-resource planning is to be undertaken, the roles of federal, state and local planning agencies must be better defined. Water-resource planning must be better integrated with overall planning. The most essential need is for an effective institutional and legal framework in which planning can take place. It is essential to recognize that at all levels of government and in all planning activity, the budget function must be wholly separated from the planning function. It is

ecommended that the Water Resources Council e reconstituted to develop a sectorial planning rogram for water and related resources; coor-inate proposals for and conduct planning, evelopment, and management activities, includ-ng and planning activities of regulatory agencies; eview all proposals for Federal authorization nd/or funding water resource development prior o submission to Congress to assure compliance ith sectorial planning and objectives; and to elegate planning roles to 'field' agencies. Public articipation, presentation of a range of alterna-ives, and increased funding and staffing are also alled for in the planning process. (Stein - North Carolina)
W74-02843

UMMARY OF THE SOUTHERN TIER EAST EGIONAL PLAN, BROOME AND TIOGA OUNTIES, NEW YORK.
gner and Niederkorn Associates, Inc., Ithaca, N.Y.

repared for the Southern Tier East Regional lanning Board, Binghamton, N.Y. 1973. 16 p, 12 g, photos. HUD 701.

escriptors: *Planning, *Regional development, Rivers, Population, Economics, Natural esources, Recreation, Flood plains, Urbaniza-ion, Land use, *New York.
dentifiers: *Riverbanks, Open space, Bingham-on, Susquehanna River, Broome County (N.Y.), ioga County (N.Y.), Tioughnioga River, Chenan-go River (N.Y.).

A series of studies for Broome and Tioga Counties emphasizing regional planning is summarized. The planning program is intended to be on-going and focus on spatial and economic relationships that cross political subdivisions. In the first two years of the program studies have included population and economic characteristics of the region, physical and structural characteristics, housing problems, and recreation and open space needs. Special emphasis is put on opportunities for providing recreational facilities and preserving open space and on the great potential of the riverbank areas of the Tioughnioga, Chenango, and Susquehanna Rivers. Major parks and connecting open areas are proposed along the river corridors. Policies established to guide development of the riverbanks include: (1) public leadership and initiative are necessary; (2) county government should provide incentives to local public and private agencies to aid in effecting the plan; (3) funds for land purchase and development should be included in regular capital improvements budget; (4) parcels of publically-owned land adjacent to the river should form nucleus of riverbanks park systems and (5) ecological balance of riverbanks should be maintained. Other proposals and policies include and protection of floodplain areas, the control of surface water runoff, the use of utility easements and abandoned railroad rights-of-way for open space, and the preservation of unique natural features. The overall regional plan recommends an expanded urban core between Binghamton and Endicott with radial development up river valleys. Several guidelines for growth and means to implement the plan are also included. (Elfers - North Carolina)
W74-02844

PLANNING FOR WATER RESUE,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05D.
W74-02845

LOWER WILLAMETTE RIVER MANAGEMENT PLAN.
SRG Partnership, Portland, Oreg.
For primary bibliographic entry see Field 04A.
W74-03121

ENGINEERING ECONOMICS OF RURAL WATER SYSTEMS: A NEW AMERICAN APPROACH,
National Water Well Association, Houston, Tex., Research Facility.
M. D. Campbell, and W. A. Hunt.
Paper Presented at National Water Well Association International Groundwater Symposium, November 20-22, 1973, Macquarie University, Sydney, Australia. 21 p, 8 fig, 15 ref.

Descriptors: *Economic feasibility, Financial feasibility, Project feasibility, *Prices, *Regional economics, *Social impact, *Wells, *Cost analysis, *Project planning, Management.
Identifiers: National Demonstration Water Project, Commission on Rural Water, Centralized management.

A review of engineering principles is presented as applied in the United States by the National Demonstration Water Project and Commission on Rural Water to its field projects. Emphasis is placed on the economic analysis of the various engineering alternatives of surface and ground water utilization in rural areas. Effectiveness of centralized management and organization is stressed. The preference of various American governmental agencies for central water systems is based on the concept of central management, which implicity promotes reliable service over many years. However, central management need not be tied to central water systems in the physical sense. The multiple well or cluster-well concept is introduced and explored within an economic analysis of system alternatives for specific project areas. The role of local conditions as they affect the ultimate configuration of the system's design is defined in quantitative and qualitative terms. (Staplin-NWWA)
W74-03152

THE UNIVERSITY AND PUBLIC POLICY IN WATER RESOURCES, PROCEEDINGS UCOWR ANNUAL MEETING HELD JULY 29-AUGUST 1, 1973 AT TEXAS TECH UNIVERSITY, LUBBOCK, TEXAS.

Universities Council on Water Resources, (University of Nebraska, Lincoln), (1973). 171 p.

Descriptors: *Universities, *National Water Commission, *Water Resources Research Act, Education, Research and development, Regional analysis, Urbanization, Water quality, Agriculture, Economics, Institutions, Water policy, Legislation, Federal Water Pollution Control Act.
Identifiers: *Public policy.

Each year the Universities Council on Water Resources holds an annual meeting on a matter of current and vital interest to the university community. In 1973, the meeting was devoted to a critical appraisal of the National Water Commission Draft Report and an examination of the importance of regional cooperation in research and education. Four workshops were conducted relative to major policy issues on problems of urbanization, water quality, agriculture, and economics and institutions. Regional workshops were organized to explore opportunities and mechanics for regional cooperation and coordination in education and research. The Proceedings includes papers presented, questions and answers on the National Water Commission Report and resolutions passed by the delegates. Papers and reports of discussions represent personal opinions of their respective authors. The resolutions reflect the view of the Universities Council on Water Resources. (See W74-03173 thru W74-03184)
W74-03172

IMPLICATIONS OF THE NATIONAL WATER COMMISSION REPORT FOR THE UNIVERSITIES COUNCIL ON WATER RESOURCES,
Stanford Univ., Calif. Dept. of Civil Engineering.
R. K. Linsley, Jr.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 1-4, 1973.

Descriptors: *National Water Commission, *Universities, *Water Resources Research Act, Research and development, Water utilization, Education, Grants.
Identifiers: *Universities Council on Water Resources.

Implications of the National Water Commission report for the Universities Council on Water Resources are briefly discussed. Areas which seem to the National Water Commission to be of importance for research include: (1) ecological, environmental and social impacts of water resources projects; (2) economic, social and environmental costs and benefits of alternate wastewater management strategies; (3) relationships between energy production and water use; (4) the role of nonpoint sources of pollution in water quality including urban storm water runoff; (5) technology for more efficient water use; and (6) new technologies in water development including such topics as desalting, weather modification, wastewater reuse, and geothermal resources. In planning programs for the future, universities might consider the need to emphasize instruction in planning, based on new guidelines and recognizing a new role for the planner. Public education is a must if public participation in water planning is to be fully effective. The universities can fill an important role in offering short courses, seminars, and lectures on water problems. Perhaps the most important immediate impact of the National Water Commission is the opportunity it offers the universities and university people to play a role in influencing water policy. (See also W74-03172) (Knapp-USGS)
W74-03173

COMMENTS ON THE REPORT OF THE NATIONAL WATER COMMISSION,
Resources for the Future, Inc., Washington, D.C.
A. V. Kneese.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 5-11, 1973. 2 photo.

Descriptors: *National Water Commission, *Universities, *Water Resources Research Act, Research and development, Water utilization, Education, Grants.

The National Water Commission report is a highly useful document for the student of water resources problems, but it would be of little value to the policymaker. It is much too long and the recommendations are given without any sense of priority. There are hundreds of such recommendations ranging from the fundamental to the trivial. The report contains many important recommendations. Among them are reform of the present procedures for benefit-cost analysis of navigation projects, improved pricing of various water services including navigation and irrigation, ending subsidies to new irrigation projects, non-Federal sharing of costs where specific users cannot be charged or where it would not be desirable to, reducing the impact of acreage limitations, conjunctive management of ground and surface water, and improved possibility for transferring water rights. (See also W74-03172) (Knapp-USGS)
W74-03174

OPPORTUNITIES FOR REGIONAL COORDINATION AND COOPERATION IN WATER RESOURCES RESEARCH,
Office of Water Resources Research, Washington, D.C.
W. A. Hall.

In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 25-32, 1973. 1 photo.

Descriptors: *Water Resources Research Act, *Universities, Education, Grants, Research and development.

In 1972, Office of Water Resources Research supported just under a thousand individual research studies conducted by 148 university campuses and 46 nonuniversity organizations. Water resources institutes provide a broad set of serious problems which will require the best requisite administrative control. Regional research in water resources would give universities the opportunity to demonstrate that the universities can indeed modify their institutional environment to accept the challenge of putting their resources to work on civil systems; that they can manage a big science research approach to civil problems in a systematic, effective, and timely way; and, at the same time, extend basic knowledge, enhance teaching, and make public service of such a quality to restore public confidence in the university system. (See also W74-03172) (Knapp-USGS)
W74-03175

REGIONAL RESEARCH OPPORTUNITIES UNDER EPA SPONSORSHIP,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
A. P. Carlin.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council of Water Resources Publication, p 33-36, 1973.

Descriptors: *Federal Water Pollution Control Act, *Universities, Grants, Training, Water quality act, Education, Water quality, Research and development.

The most important criteria against which all of EPA's proposed projects in research are judged are the importance of the problems addressed from a national standpoint and the potential transferability of the knowledge gained to similar problems elsewhere. Section 104 (s) of the Federal Water Pollution Control Act Amendments of 1972 provides that the Administrator of EPA is authorized to make grants to one or more institutions of higher education (regionally located and to be designated as River Study Centers) for the purpose of conducting and reporting on interdisciplinary studies on the nature of river systems, including hydrology, biology, ecology, economics, the relationship between river uses and land uses, and the effects of development within river basins on river systems and on the value of water resources and water-related activities. (See also W74-03172) (Knapp-USGS)
W74-03176

SOCIAL AND ECONOMIC IMPACT ON URBAN AREAS OF 'WATER POLICIES FOR THE FUTURE,' THE NATIONAL WATER COMMISSION REPORT,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
G. E. Willeke.
In: The University and Public Policy in Water Resources: Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 39-48, 1973. 3 ref.

Descriptors: *National Water Commission, *Social aspects, *Economics, *Planning, Water utilization, Water policy, Water resources development, Cost allocation, Cities, Urbanization.

The National Water Commission's conclusions and recommendations are of great importance to urban areas. Its positions on the conduct of specific programs, especially water quality, on the division of powers among levels of government, on subsidies, on responsibilities, and on evaluation procedures are strong and represent considerable departures from the present situation. The Commission's report is a policy document, proposing policies that touch on almost every important aspect of the use of water resources. The Commission proposes that identifiable beneficiaries should pay for the costs of obtaining those benefits that accrue to them. A polluter of the environment should pay for maintaining environmental quality. Development, management, and protection of water resources should be controlled by the level of government that is closest to specific problems and capable of fairly representing all interests involved. Sound economic principles must be adopted to encourage better use of water resources. Future water programs should shift emphasis from water development to preservation and enhancement of water quality. Planning for water development must be linked to planning for water quality and coordinated with land use planning. It is suggested that on balance, urban areas should be better off if the Commission's recommendations are followed. The benefits should be better service, reduced red tape, greater self-reliance and competence, and fewer crises. Most water crises could be averted by planning, conservation measures, and willingness to consider a wider range of alternatives. (See also W74-03172) (Knapp-USGS)
W74-03177

POLICY ISSUES RELATED TO URBANIZATION,
Colorado Univ., Boulder. Dept. of Civil Engineering.
J. E. Flack.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 49-51, 1973.

Descriptors: *National Water Commission, *Social aspects, *Economics, *Planning, Water utilization, Water policy, Water resources development, Cost allocation, Cities, Urbanization.

Based upon the conclusions and recommendation of the National Water Commission, it is possible to predict urban water resource systems of the future. Metropolitan water systems would be operated on a regional basis, wherein all water and sewer services would be consolidated. The charges for water and sewer service would fully cover the costs of service and, in addition, provide aid to water-related recreational and aesthetic amenities. Water resource planning and management would be integrated with and subservient to general land use controls in the urban area. Water conservation would be widely practiced through pricing mechanisms, education and public relations, plumbing codes requiring water saving devices, and through successive use and reuse of the limited water supply. Reuse for domestic purposes would be planned for in the future when health related objectives have been met. Urban areas would cooperate and coordinate their water supply and sewer services to obtain optimum levels of service. Interstate compacts would be in effect in those metro areas that involve multiple state jurisdictions. Knowledge of urban hydrology would be supported to permit integration of all of the water resources of urban areas into a single system. (See also W74-03172) (Knapp-USGS)
W74-03178

WATER QUALITY ISSUES IN THE NATIONAL WATER COMMISSION'S REPORT 'WATER POLICIES FOR THE FUTURE',
Massachusetts Univ., Amherst. Water Resources Research Center.
B. B. Berger.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 57-64, 1973.

Descriptors: *National Water Commission, *Water pollution control, *Water quality, *Planning, Water reuse, Water supply, Regulation, Water law.

Water quality issues examined in several chapters of the National Water Commission's report are reviewed. The use of dual municipal water supply systems, one for direct human use, the other for manufacturing purposes, should be considered. The provisions of the Water Quality Act of 1972 calling for the 'best available treatment economically achievable' by nonpublic owned plants by 1983, and 'no discharge' by 1985 are not in the public interest. The provisions of the Water Quality Act of 1965 constitutes a sound basis for a national water pollution abatement program and they are preferable to the treatment and effluent requirements of the Water Quality Act of 1972. A requirement for uniform treatment of wastes on a national basis is unsound. A policy based on treatment requirements appropriate to the needs of specific sites is more prudent. A requirement that water quality standards be met 100% of the time should not be considered realistic unless it is demonstrated that the benefits outweigh the costs. The polluter should pay the full cost of abating his pollution, and to this end, federal subsidies for construction of treatment plants should be discontinued. Programs for data collection, storage, and retrieval are inadequate and they should be strengthened. Methods offering promise for reducing and controlling pollution by urban storm runoff should be fully exploited. (See also W74-03172) (Knapp-USGS)
W74-03179

HIGHLIGHTS AND ISSUES OF THE 1972 AMENDMENTS TO THE FEDERAL WATER POLLUTION CONTROL ACT,
North Carolina Water Resources Research Inst., Raleigh.
D. H. Howells.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 65-72, 1973.

Descriptors: *Federal Water Pollution Control Act, *Universities, Grants, Training, Water quality act, Education, Water quality, Research and development.

The 1972 amendments to the Federal Water Pollution Control Act are discussed as the basis for possible action by the Universities Council on Water Resources. The amendments represent a fundamental shift in national policy for water pollution control. Some of the changes are harmonious with the recommendations of the National Water Commission and some are not. The basic goals of the 1972 amendments provide for the attainment of water quality necessary for recreation, fish, and wildlife by 1983 and the elimination of the discharge of pollutants by 1985. The strategy for implementation of the Act expressed by the Environmental Protection Agency is to provide critical information quickly where now lacking and to institute a strong program immediately where data are available. The initial emphasis is to issue permits for selected major dischargers, undertake planning and monitoring in basins where pollution is concentrated, award grants for construction

works, and take enforcement action against violators. (See also W74-03172) (Knapp-USGS)
W74-03180

IMPLICATIONS OF SELECTED NATIONAL WATER COMMISSION RECOMMENDATIONS TO AGRICULTURAL POLICY,
North Dakota Water Resources Research Inst., Fargo.
D. O. Anderson.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 79-84, 1973.

Descriptors: *National Water Commission, *Agriculture, Water supply, Water demand, Universities, Irrigation water, Comprehensive planning, Water policy.

Irrigated agriculture is the dominant consumptive user of water in the United States. The National Water Commission estimated that consumptive use of water by irrigated agriculture represented about 83% of the total in 1970. The Commission concludes its analysis of the agricultural demand for water by stating that land reclamation measures such as irrigation and drainage of new land, protection of existing and potential cropland from floods, and provision of supplemental irrigation water for existing croplands have thereby contributed to high costs of crop price support and land retirement programs. American agriculture would not be faced with strains on its aggregate food producing capacity by the year 2000. Capacity to produce is sufficiently large even if irrigated agriculture is not increased over the next 30 years. Food demands can be met by returning idle farmland back to production with the use of less irrigated land than presently exists. Irrigation could be reduced even further by feeding vegetable protein to people rather than feeding it to livestock. Agriculture in the western states could in fact release substantial quantities of water for industrial and urban uses in time of need. Increasing price of water in 17 western states should result in a reallocation of water from agriculture to other sectors without affecting the nation's feed supply, meeting export demand, or increasing price of food. (See also W74-03172) (Knapp-USGS)
W74-03181

WATER RESOURCES POLICY ISSUES RELATED TO AGRICULTURE,
Utah Water Research Lab., Logan.
J. M. Bagley, and J. C. Andersen.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 85-90, 1973.

Descriptors: *National Water Commission, *Agriculture, *Water policy, Water resources development, Water pollution control, Irrigation water, Land reclamation.

Agricultural water issues related to the report of the National Water Commission are briefly reviewed. They include efficiency of water use, elimination of pollutants, water quality standards, conflict with urban needs, farm productivity, federal land-use policies, irrigation development, and farm subsidies. (See also W74-03172) (Knapp-USGS)
W74-03182

INSTITUTIONAL PROBLEMS IN THE WATER RESOURCES FIELD,
Rutgers - The State Univ. Princeton, N.J. Water Resources Research Inst.
W. Whipple, Jr.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 95-101, 1973. 3 ref.

Descriptors: *National Water Commission, *Planning, *Institutions, Administration, Water policy, Comprehensive planning, Water resources development, Economics.

Institutional aspects of the National Water Commission report are discussed. There are only a few recommendations for changes in program responsibility between agencies, and little discussion of the main problems. The main recommendation of the Commission is to leave the principal federal organizations in their present form, subject to certain changes in program emphasis. The recommendations to strengthen the Water Resources Council and to transfer it to the Executive Office of the President are considered sound. A federal review board is needed to review project proposals. This board will accomplish a vitally important function if environmental and water quality aspects are adequately considered in planning. There are at least three sound basic institutional approaches to managing water quality planning: (1) make the EPA entirely responsible for major rivers; (2) make the states and the various interstate agencies primarily responsible; and (3) divide the country (or at least the heavily developed regions) into a system of river basin authorities, each of which would be responsible for controlling water supply, pollution control, and recreational water programs in the area. (See also W74-03172) (Knapp-USGS)
W74-03183

A CHALLENGE TO THE ACADEMIC COMMUNITY: ECONOMICS AND INSTITUTIONS IN THE REPORT OF THE NATIONAL WATER COMMISSION,
New York State Coll. of Agricultural and Life Sciences, Ithaca. Dept. of Agricultural Economics.
D. J. Allee, and H. M. Ingram.
In: The University and Public Policy in Water Resources; Proceedings of UCOWR Annual Meeting, Texas Tech University, July 29-August 1, 1973: Universities Council on Water Resources Publication, p 102-111, 1973. 12 ref.

Descriptors: *National Water Commission, *Planning, *Institutions, Administration, Water policy, Comprehensive planning, Water resources development, Economics.

The major underlying values of the report of the National Water Commission are discussed. The writers of the report have a strong commitment to a vision of rationality that follows the Wilsonian vision of ideal public administration and the separation of politics and administration. The ideal is a detached, disinterested, stakeless expert who decides on the basis of complete and unbiased information. As a result numerous suggestions are made to improve the data base for decisionmaking but little attention is given to the incentives to actually use new data. In order to evaluate the possibilities for combinations of water uses within a river basin, the Commission sees a need for systems analysis. Agencies are criticized for not living up to their ideal. The draft report strongly disapproves of the bias which federal agencies have in favor of their own missions. The Commission's vision of rationality excludes the possibility, raised by a number of modern students of public administration, that biased actors pursuing their own self-interest in a bargaining arena may in the end come up with decisions as rational as might be delivered by the disinterested, objective expert. (See also W74-03172) (Knapp-USGS)
W74-03184

EAGLE NEST LAKE: REVISED APPRAISAL.
Lomax and Associates, Albuquerque, N. Mex.

Four Corners Regional Commission, New Mexico State Planning Office, Santa Fe, Report July 1971. 22 p.

Descriptors: *Appraisals, *Recreation, *Project planning, Financing, Grants, Lakes, Analysis, Economic justification, *New Mexico.
Identifiers: *Eagle Nest Lake (NM).

Eagle Nest Lake in New Mexico was first appraised in 1969. The 4884 acre tract, including the lake and retention dam having existing storage capacity of 79,000 acre-feet for surplus and flood waters, are currently privately owned. A second appraisal was conducted in 1971 to meet current Bureau of Outdoor Recreation requirements for grant-in-aid in the proposed purchase of the property. Under this criteria, storage was limited to 21,000 acre-feet, close to the original river bed's capacity. The revised report includes a description of the site and improvements, its current assessed value, annual tax load, existing zoning, its highest and best use, and a justification of its appraised value. The current assessed value of the property is $46,820 with an appraised land value of surrounding land at $688,000. The highest and best use of the unzoned land continues to be as a recreational lake. The appraised value of the site, dam, lake, and water rights is found using either the market analysis or summation approach, yielding $2,910,000 or $2,970,000 respectively. The first value is suggested as preferable because it explicitly accounts for the recreational value of the property. Inclusion of tidelands would raise the value by $180,000. (Schroeder-Wisconsin)
W74-03188

VALUE COMPARISONS IN FREE-FLOWING STREAM DEVELOPMENT,
George Washington Univ., Washington, D.C. Natural Resources Policy Center.
J. L. Knetsch.
Natural Resources Journal, Vol 11, No 4, p 624-635, 1971. 5 fig, 7 ref.

Descriptors: *Recreation demand, *Economic justification, *Alternative planning, Wild rivers, Project feasibility, Prices, Cost-benefit analysis, *Benefits.
Identifiers: *Demand curve.

The proper criterion to determine recreation benefits is willingness-to-pay, found by integrating the area under the appropriate demand curve. Existing federal practices as suggested in Supplement One of Senate Document 97, however, assume recreation benefits are equal to the total number of recreation days estimated for a site multiplied by a unit-day value dependent on the development level of the site, and ranging from $1.50 to $6.00. These two criteria are different and such a difference may adversely affect projects such as free-flowing water recreation. Willingness-to-pay benefits are dependent on the number of people who might be attracted and is one slope of the demand curve. It is likely that the slope for many recreation opportunities demand curves is relatively flat. However, for recreation opportunities associated with free-flowing water, the number of possible visitors may be small but the slope may be very steep. The existing federal practice does not consider the slope; instead undeveloped free-flowing sites are equated by recreational prices to all other undeveloped sites. As a result the procedure ascribes the greatest value to the alternatives attracting the greatest number of persons instead of those who have the greatest willingness-to-pay. (Schroeder-Wisconsin)
W74-03190

WELLS AND WELFARE. AN EXPLORATORY COST-BENEFIT STUDY OF THE ECONOMICS

OF SMALL-SCALE IRRIGATION IN MAHARASHTRA,
Organization for Economic Co-Operation and Development, Paris (France). Development Centre.
D. Lal.
Development Centre Studies Series on Cost-Benefit Analysis Case Study No 1, July 1972. 162 p. 10 fig, 51 tab, 46 ref, 3 append.

Descriptors: *Irrigation wells, *Wells, *Agriculture, *Cost-benefit analysis, Investment, Risks, Rainfall, *Welfare (Economics), Prices, Hydrogeology, Crop production, Sugarcane, Methodology, Evapotranspiration, Grains (Crops).
Identifiers: *India (Maharashtra), Shadow pricing.

Small-scale irrigation, or more specifically open wells, is examined in a form of agricultural investment in the Ahmednagar District of Maharashtra, India. Due to undependable and inadequate rainfall irrigation is an important precondition for increased crop yields. Irrigation water is both an important and scarse resource, whose allocation between competing uses has large welfare effects. In the Ahmednagar District, rainfall is limited and variable so that agricultural patterns and yields can be greatly altered by irrigation. Since market prices are distorted, this study uses 'shadow' prices when evaluating the social welfare rate of return for small scale irrigation projects. There are two major sources of uncertainty regarding the estimated functions: the amount of rainfall available in any crop season, and the likelihood of finding water at different depths and in various quantities. By using shadow prices and factoring in uncertainty, some specific questions about small scale irrigation in the region are answered, i.e., what is the social rate of return of small scale irrigation in the region. Is it socially desirable to use irrigation water for producing sugarcane or jowar (a staple food-grain) in this region. What is the social rate of return to a preinvestment hydrogeological survey to determine the geology and water resources of the region. (Pinsky-Wisconsin)
W74-03192

ECONOMIC AND POLITICAL OBJECTIVES IN FISHERY MANAGEMENT,
Washington Univ., Seattle. Dept. of Economics.
J. A. Crutchfield.
Transactions of the American Fisheries Society, Vol 102, No 2, p 481-491, 1973. 14 ref.

Descriptors: *Management, *Fisheries, *Commercial fishing, *Welfare (Economics), Foreign trade, Political constraints, Multiple-purpose projects, Economic efficiency, Income distribution, Theoretical analysis, Regulation.

Fisheries present a major case of market-mechanism failure which appear to demand public management of the industry to include the regulation of fishing mortality, the enhancement of natural fish production, and the accelerated development of knowledge and technology required to convert latent stocks into economically useful resources. Economic, social, and political factors must all be incorporated into a balanced, multi-objective fishery management program. The welfare output or utility of a fishery management program may be denoted by the equation: U ± (Z sub 1, Z sub 2 . . . Z sub n), where the Z's are desirable outcomes of the policies. The Z's can all be ranked in ordinal terms but not in a single dimension or by a common yardstick (such as dollars), which requires making explicit choices among conflicting objectives. Among the outputs of the program which must be considered are the economic efficiency, the effect on income distribution, the impact on employment in the localities affected, the repercussions on social-value systems, and the effect on the balance of payments of countries involved. A major difficulty in the successful establishment and implementation of a balanced fishery management program is that government agencies involved often lack the capability to set quantitative economic goals and criteria. (Pinsky-Wisconsin)
W74-03195

ECONOMIC AND SOCIAL PURPOSES RELATED TO WATER MANAGEMENT,
Oxford Univ. (England).
W. A. Wright.
Report 85247, Water Management Sector Group, Organisation for Economic Co-operation and Development, Paris. June 1972. 50 p. 90 ref.

Descriptors: *Water management (Applied), *Equity, *Economic efficiency, *Regional development, Local governments, Foreign countries, Irrigation, Intangible benefits, Intangible costs, Political constraints, Foreign countries.
Identifiers: *Water management objectives, Environmental quality, Economic incentives.

Clear objectives provide a nation's water planners with a criteria by which to judge the desirability of competing proposals and trade-offs. Six objectives are identified as having major acceptance among water resource authorities: (1) equity, (2) economic efficiency, (3) regional development, (4) environmental quality improvement, (5) cooperation with local administrations, and (6) cooperation with the water authorities of other countries. Equity considerations must underlie specific programs which require funding together with changes in the economic and legal policies of a country. Better economic information and a framework of incentives should be used to reach the goal of greater economic efficiency. Those water resource programs which stress regional development, often ignore economic efficiency, placing too much emphasis on agricultural versus industrial development. In evaluating the objective of environmental quality improvement, intangible benefits, as well as tangible benefits, must be considered. Successful programs require cooperation, both within a country and among nations. (Pinsky-Wisconsin)
W74-03197

PROBLEMS AND INSTRUMENTS RELATING TO THE ALLOCATION OF ENVIRONMENTAL COSTS.
Organization for Economic Co-Operation and Development, Paris (France). Water Management Section Group.

Report 89771, 1972. 64 p. 1 fig, 1 tab, 42 ref.

Descriptors: *Administration, *Environmental effects, *Social participation, Water demand, International commissions, Governments, Hydrologic cycle, Social values, Decision making.
Identifiers: Water managers, International cooperation.

Research is providing new knowledge which must be incorporated into water management decision making. Paralleling this is an increased demand for water usage from industry, agriculture, navigation, and recreation. Water managers must meet these growing water needs, while at the same time, they must be more sensitive to the environmental impacts and social consequences of their actions. It was concluded at the special session of the OECD Water Management Sector Group that environmental considerations should be incorporated into water management decisions. However, many environmental values are intangible. These non-monetary and largely unquantified values do not stand up well in a decision making process which relies heavily on measurements and data of a more scientific and quantified nature. Consequently, new methods of evaluation of environmental impacts are needed. This will require innovations in environmental monitoring, new data requirements, and changes in the scheduling and timing of planning studies. One suggested approach is to adapt the planning process and the institutional arrangements in such a way as to encourage more direct participation of the public, or selected interest groups, as well as the environmental scientists. Comparison of developments in different countries, as well as restrospective studies of past decisions are also proposed. (Pinsky-Wisconsin)
W74-03198

OPTIMAL INVESTMENT ORDERS UNDER UNCERTAINTY AND DYNAMIC COSTS: THEORY AND ESTIMATES,
Florida State Univ., Tallahassee. Dept. of Economics, and Urban Inst., Washington, D.C.
J. C. Chang, and C. C. Holt.
Southern Economic Journal, Vol 39, No 4, p 508-525, 1973. 2 tab, 23 ref.

Descriptors: *Investment, *Optimization, *Mathematical studies, *Capital, *Risks, Profit, Costs, Decision making, Theoretical analysis.
Identifiers: Cobb-Douglas production function.

A normative theory of investment decision making that considers lead time, uncertain future demand for capital services, and the minimization of costs associated with fluctuations in investment orders is developed. An optimal capital stock which will maximize profits under certainty is derived from a Cobb-Douglas production function. From this equation, the expected desired stock of capital under uncertain forecasts is derived. Since there are costs associated with fluctuating investment orders, a new decision rule is added that factors into the profit maximization equation both the dynamic costs of fluctuations in investment orders and the costs associated with deviations from the desired capital stock. From these equations, the desired capital stock under uncertainty of forecasts, and the optimal investment orders can be derived. (Pinsky-Wisconsin)
W74-03199

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

A STUDY OF COMMERCIALLY IMPORTANT ESTUARINE-DEPENDENT INDUSTRIAL FISHES,
Louisiana Wild Life and Fisheries Commission, New Orleans.
F. Dunham.
Technical Bulletin No 4. December, 1972. 63 p, 27 fig, 11 tab, 133 ref. 2-94-R.

Descriptors: *Estuarine fisheries, *Fish management, *Estuaries, Commercial fishing, Breeding, Ecology, Fish reproduction, Dredging, *Louisiana, Gulf of Mexico.
Identifiers: *Industrial fishing, Bay anchoy, Atlantic croaker, Gulf menhaden.

The study was conducted from July, 1969 through June, 1972, in barataria and Caminada Bays which are about 40 miles west of the mouth of the Mississippi River, and is intended to help the fishing industry to determine how best to utilize the state's fish resources and to suggest measures to preserve the estuarine breeding grounds. Much of the study consists of data from the samples: Bay anchovy was the most abundant fish and Atlantic croaker, which is increasing rapidly in the area, was the most abundant commercial fish. About 97% of the fish caught along the Louisiana coast are dependent upon estuarine habitat during their life cycle. Thus, the preservation of estuarine areas is very important. Some of the recommendations to this end are the close examination of any dredging or landfill proposals for estuarine areas, the education of the public on the importance of industrial fish and their estuarine habitats, further research on the movements and life cycles of commercial

and industrial fish, and the establishment of a specific harvest season for certain industrial fish. (Elfers - North Carolina)
W74-02839

A METHOD FOR INDUSTRIAL WASTE CONTROL AND SURCHARGE ASSESSMENT,
Saint Louis Metropolitan Sewer District, Mo.
B. A. Rains.
Presented at the 1973 Annual Meeting, Missouri Water Pollution Control Association, February 15-27, 1973, Kansas City, Missouri. 41 p, 13 fig, 1 tab.

Descriptors: *Assessments, *Industrial wastes, *Waste water disposal, *Data collections, *Econometrics, *Administration, Discharge water, Costs, Cost-benefit analysis, Cost sharing, Legal aspects, Sewage districts, Methodology, Sampling, On-site investigations, Statistics, Industries.
Identifiers: *Industrial waste surcharge assessment, *Industrial discharges, *User charges.

The Metropolitan St. Louis Sewer District has, in accordance with recent federal legislation, developed a technically oriented method for equitably determining industrial surcharge assessments and regulating industrial waste discharges. The method and the various procedures utilized for implementation are discussed. Included is information on waste water data acquisition by industrial reporting, office administrative and recording procedures, field sampling technique and frequency,, laboratory verification, ordinance violation notification and surcharge billing. Examples of control forms used are presented. It is the purpose of this paper to present the procedures utilized in this newly developed method and by example hopefully assist those municipalities and special sewer districts comtemplating an industrial surcharge program. Portions of MSD's program may have sufficient merit for inclusion in the program being developed by other local governments. A secondary objective of this paper is to alert those industries with waste water discharges of the items of concern to a municipal sewer system and the possible financial commitments and treatment responsibilities to be encountered. It is considered that by June of this year, all industries of potential surcharge will have been officially requested to report the quality of their waste water discharges to the District. By the billing date for the second period of 1973, all industries within the District that are in a surcharge category should be included in the billing procedure. (Poertner)
W74-02850

AN ECONOMIC FEASIBILITY STUDY OF FAYETTEVILLE, NORTH CAROLINA, TREATING FORT BRAGG'S WASTEWATER,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 05D.
W74-03187

A FORECASTING MODEL APPLIED TO POLLUTION CONTROL COSTS,
Chase Econometric Associates, Inc., New York.
For primary bibliographic entry see Field 05G.
W74-03189

REUSE IRRIGATION CUTS COSTS,
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 05D.
W74-03194

6D. Water Demand

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO: UPPER RIO GRANDE,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W74-02660

HILLSBOROUGH COUNTY, FLORIDA: POPULATION PROJECTIONS AND ENVIRONMENTAL FACTORS.
Hillsborough County Planning Commission, Tampa, Fla.

April, 1972. 42 p, 7 fig, 7 tab.

Descriptors: *Projections, *Population, *Water demand, *Sewage effluents, Water supply, Solid wastes, Landfills, Groundwater, Water resource planning, Environmental effects.
Identifiers: Hillsborough County (Fla.).

Population projections extend to 1990 and are related to future water supply demands, solid waste generation, and waste water generation. Hillsborough County population is expected to increase by about 50% from 1970 to 1990. Water supply demands are also expected to increase by 50% during this period. This will require careful water resource planning because of such problems are lowered groundwater levels, salt water intrusion, and water pollution. It is likely that water supply will be a critical factor limiting growth in the county. Solid waste generation is expected to increase by 92% in 1980 and 254% by 1990. At least four new sanitary landfill sites are needed in the near future, but it is difficult to find suitable sites because of poor soil conditions and high water tables. Sewage effluent is expected to increase by 50% in 1990. This increase will pose considerable problems since present effluents are not adequately treated. There is a great need for expanded sewerage systems and restrictions on use of septic tanks. A more detailed analysis of population versus water supply, solid waste and sewage effluent is needed. (Elfers - North Carolina)
W74-02838

WATER SUPPLY AND SEWAGE FACILITIES PLAN UPDATE--1970, LEHIGH-NORTHAMPTON COUNTIES, PENNSYLVANIA.
Lehigh-Northampton Counties Joint Planning Commission, Lehigh Valley, Pa.
For primary bibliographic entry see Field 05D.
W74-02848

REGIONAL PLANNING FOR SEWERAGE SYSTEMS,
Los Angeles County Sanitation District, Calif.
For primary bibliographic entry see Field 06A.
W74-02860

LAND USE AND WATER RESOURCES,
East Malling Research Station, Maidstone, (England).
For primary bibliographic entry see Field 02A.
W74-03024

THE CALIFORNIA STATE WATER PROJECT SUMMARY: NINETEEN-SEVENTY-TWO, APPENDIX C.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 04A.
W74-03026

MASTER WATER PLAN, LAS VEGAS VALLEY, (WITH MAP SUPPLEMENT).
Boyle Engineering, Las Vegas, Nev.

Prepared for Las Vegas Valley Water District. August, 1970. 232 p, 42 fig, 102 tab, append.

Descriptors: *Planning, *Water supply, *Water distribution, *Water sources, *Systems analysis, Groundwater, Water storage, Water demand, Cost analysis, *Nevada.
Identifiers: *Las Vegas Valley, Colorado River, Clark County (Nev.), South Nevada Water Project.

An engineering-oriented plan is presented to guide the expansion and improvement of water supply systems in the Las Vegas Valley Water District. Focus is on the analysis, both physical and economic, of water distribution system alternatives. Each pressure zone in the District is treated separately with discussions of the existing system operation, the proposed system and water demands, and a mathematical analysis of the operation of the proposed system. The proposed plan including reservoirs, pumping stations, and major pipelines is based on the General Plan for Clark County and the urban development assumptions therein. The main sources of water for the District are the Colorado River, from which Nevada receives an annual allocation of 300,000 acre-feet, groundwater at the rate of 50,000 acre-feet per year, and reclaimed water which is available to the Southern Nevada Water Project at the rate of 137,500 acre-feet per year. It is recommended that groundwater can best be used during the summer when peak demands are the highest, and that a program be undertaken to find high yield aquifers in the northwestern parts of the Valley. Supplemental maps are bound separately. (Elfers - North Carolina)
W74-03117

OREGON'S LONG-RANGE REQUIREMENTS FOR WATER.
Oregon State Water Resources Board, Salem.

June, 1969. 399 p, 42 plates, 89 tab.

Descriptors: *Oregon, Water resources development, *Water requirements, *Water allocation (Policy), *Projections, Regional development, Government water supply, Water utilization, Planning, Water shortage, River basin irrigation, Water demand.
Identifiers: *Inter-state water transfer.

Based on the assumption that the amount of water within a river basin that can be relied on to furnish the needs of the basin is the amount of water that is equalled or exceeded in 4-of-5 years, Oregon's 18 river basins supply 65,940,000 acre-feet of water. With a projected demand of 80,380,000 acre-feet in the year 2070, this would result in a statewide deficit of 14,400,000 acre-feet. The drier portion of the state (east of the Cascade Range) will have a projected deficit of 28,650,000 acre-feet in 2070, while the western section will have a projected surplus of 14,210,000 acre-feet. Water requirements (for 2020 as well as 2070) and available flow data were figured for each of the basins. Water requirements for irrigation was found the single largest beneficial use of water, 36,010,000 acre-feet in 2070, including 1,960,000 acre-feet that will be needed in the coastal basins. Preliminary estimates of future water requirements in Montana, Wyoming, Idaho, and Washington are presented, and a summary table shows the needs of the Pacific Northwest, together with an estimate of the available supply. Some of the data required prior to negotiations for an interstate compact to transfer water (to the Pacific Southwest), such as data on hydroelectric power and the water requirements for a thermal plant, are reported upon. (Hoffman - North Carolina)
W74-03119

THE OCEAN EDGE OF SAN DIEGO,
San Diego City Planning Dept., Calif.
L. Okeson, and M. Clark.
July, 1969. 112 p, 16 fig, 8 tab, 26 ref, 13 append.

Descriptors: *Beaches, *Recreation facilities, *Shore protection, *Water demand, *Water resources development, Seashores, Sands, Recreational demand, *California.
Identifiers: Regional water resources, *San Diego (Calif).

A unique and valuable resource, San Diego's ocean beaches and other shoreline areas are subject to increasing use demand. By 1990, it is estimated that total beach attendance will approximate 12 million persons per year. However, the shoreline areas are not only physically limited, by they are exposed to natural erosive forces that wash away the sand from the beaches and cut back the abutting bluffs and cliffs. The expenditure package proposed would offer a systematic approach to keeping up the with the projected demand and maximizing the use of San Diego's shoreline. Recommendations for action are grouped into three major categories: maintaining supply, maximizing usage, and financing improvements. Two conclusions are that the beaches are more properly to be regarded as regional rather than as merely city resources and that the cost of maximizing these resources must be shared. A joint city and county study is suggested to be establish a formula for the sharing of the cost of financing capital improvements and maintaining the beach resources. (Hoffman - North Carolina)
W74-03120

GROUND WATER IN THAILAND,
Department of Public Works, Bangkok (Thailand). Provincial Water Supply Div.
For primary bibliographic entry see Field 04B.
W74-03150

DEVELOPMENT IN DEEP SANDSTONE AQUIFER ALONG THE ILLINOIS RIVER IN LA SALLE COUNTY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 04B.
W74-03163

IMPLICATIONS OF SELECTED NATIONAL WATER COMMISSION RECOMMENDATIONS TO AGRICULTURAL POLICY,
North Dakota Water Resources Research Inst., Fargo.
For primary bibliographic entry see Field 06B.
W74-03181

ECONOMIC POLICY FOR WATER RESOURCES AND PLACEMENT FLOWS,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 04B.
W74-03191

6E. Water Law and Institutions

RIVER: RECOMMENDATIONS FOR IMPROVING THE VALLEY ENVIRONMENTAL RESOURCES,
North Dakota State Univ., Fargo. Coll. of Engineering and Architecture.
For primary bibliographic entry see Field 06B.
W74-02651

RIVER, RECOMMENDATIONS FOR IMPROVING THE VALLEY ENVIRONMENTAL RESOURCES, ADMINISTRATIVE REPORT,
North Dakota State Univ., Fargo. Coll. of Engineering and Architecture.
For primary bibliographic entry see Field 06B.
W74-02652

PRESERVATION OF WILDERNESS AREAS--HEARING ON S2453 AND RELATED WILDERNESS BILLS.

Hearing--Subcomm. on Public Lands of Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong, 2d Sess, May 5, 1972. 273p.

Descriptors: *Wildlife, *Preservation, *Federal government, Waterfowl, Wildlife conservation, Management, Environmental effects, Ponds, Streams, Lakes, Submerged lands, Spawning, Legislation, Aquatic habitats.

This is a hearing before the Subcommittee on Public Lands of the Committee on Interior and Insular Affairs of the Senate on Preservation of Wilderness Areas designed to designate certain lands as wilderness. This bill will place fourteen additional areas in the Wilderness Preservation System. These areas give added protection to submerged lands, spawning waters, waterfowl, ponds, streams, lakes and other scenic areas. Environmental statements have been submitted with each of the bills showing probable impact, adverse environmental effects without congressional action, alternatives open and relationships between local short-term and long-term productivity. (Daniels-Florida)
W74-02779

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1974.
Hearings, Part 6--Subcomm. of the Comm. on Appropriations, U.S. House of Representatives, 93d Cong, 1st Sess (May 14, 1973). 1265 p, 41 tab.

Descriptors: *Water policy, *Water conservation, *Federal government, *Federal budget, Water supply, Environmental effects, Public works, River basin development, Water resource development, Water allocation, Water control, Projects, Construction.
Identifiers: Congressional hearings.

Part 6 of hearings in the House of Representatives before the Subcommittee of the Committee on Appropriations concerning the public works and water and power development and Atomic Energy Commission appropriation bill for 1974, includes testimony of members of Congress and other individuals and organizations on a water resource program. Testimony of the many witnesses covered such subjects as flood control, irrigation, a national policy for water, public works projects, environmental factors, river projects, water resources development, water supplies, planning, construction and conservation. This is generally an appropriations bill and many witnesses were before the Committee to explain their needs and requests for funds for the 1974 fiscal year. (Daniels-Florida)
W74-02780

RIVER BASIN AUTHORIZATIONS AND RELATED WATER RESOURCE PROJECTS.
For primary bibliographic entry see Field 04A.
W74-02781

IMPLEMENTATION OF THE FEDERAL WATER POLLUTION CONTROL ACT.

Hearing--Subcomm. on Investigations and Review of the Comm. on Public Works, U.S. House of Representatives, 93d Cong, 1st Sess, June 14, 1973. 51 p, 4 tab.

Descriptors: *Federal Water Pollution Control Act, *Legislation, *Administration, *Legal aspects, Water pollution control, Water quality standards, United States, Governmental interrelations, Administrative agencies, Federal budget.
Identifiers: Congresssional hearings.

This subcommittee was instrumental in drafting and securing passage of the Water Pollution Control Amendments of 1972. The purpose of this hearing was to determine how the grant program was progressing and to obtain a clear understanding of the grant policies that have been developed as well as the regulations that have been promulgated and the objectives that are being sought by the Environmental Protection Agency. The basic purpose of this legislation was to continue the policy of encouragement to the states to build water pollution control facilities and to change some major aspects of water pollution law. Subsequent to enactment, difficulties began to arise which led some persons to question whether the administration was going to implement the act as to fulfill the intent of Congress. Included is a chronology of events regarding impoundment of water pollution funds. The specific question chosen to illustrate the problem is: What is causing the delay in the construction of New Hampshire water pollution projects. (Sears-Florida)
W74-02782

THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972: AMBIGUITY AS A CONTROL DEVICE,
R. Rauch.
Harvard Journal on Legislation, Vol. 10, p 565-595, 1973. 147 ref.

Descriptors: *United States, *Water pollution control, *Water pollution standards, *Federal Water Pollution Control Act, Legislation, Environmental control, Pollution abatement, Legal aspects, Economic impact, Economic feasibility.

The Federal Water Pollution Control Act Amendments of 1972 (Amendments) were passed with the desire to rapidly improve the quality of the Nation's water and with concern over the high cost of achieving this improvement. The regulatory scheme devised to reconcile these competing purposes is evaluated. One segment of the paper recounts the struggle to produce new water pollution control legislation; one analyzes the two standards Congress established--i.e. best practicable control technology currently available and best available technology economically achievable; and the third part suggest problems which may arise in applying the technology assessment procedure and examines difficulties already encountered in implementing the law. The Environmental Protection Agency (EPA) faces problems in resolving the conflict between the desire for improvement and concern over the cost. Even if the EPA meets the deadlines set out by the Amendments, it may find it impossible to achieve 'reasonable further progress' beyond this point without triggering massive economic dislocation. (Daniels-Florida)
W74-02784

THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972.
Boston College Industrial and Commercial Law Review, Vol. 14, p 672-673, 1973. 379 ref.

Descriptors: *Water pollution control, *Legislation, United States, *Federal Water Pollution Control Act, *Water quality control, Water pollution, Governments, Legal aspects, Planning, Regulation, Water law, Jurisdiction, Governmental interrelations, Waste water treatment, Abatement.

The first national prescription for water pollution was the Federal Water Pollution Control Act of 1948. It proved inadequate and was amended five times between 1956 and 1970, but the amendments failed to develop a comprehensive scheme to reduce and eliminate water pollution and thereby necessitated the Federal Water Pollution Control Act Amendments of 1972 (Amendments) which totally restructure the water pollution control program. The manner in which the amendments have restructured the water pollution control program is illustrated and the extent to which they will effec-

tuate the reduction and elimination of water pollution is discussed. After a brief survey of the inadequacies of prior legislation and the goals of the Amendments, attention is focused on three specific elements of the present water pollution control program: the program for the construction of waste treatment facilities, the establishment of standards and the enforcement of those standards. The latter two elements are examined on both the federal and state levels. The coordination of state and federal programs is surveyed in detail. (Sears-Florida)
W74-02785

THE RISE AND FALL OF NATURAL RESOURCE SYSTEMS,
George Washington Univ., Washington, D.C.
J. Kratchman.
Land and Water Law Review, Vol. 8, No 2, p 429-466, 1973. 102 ref.

Descriptors: *Natural resources, *Water resources development, *Legal aspects, *Systems analysis, Comprehensive planning, Water utilization, Water supply.

There is a systematic pattern of development common to all natural resource legal systems. The recognition and study of these similarities may serve many useful functions. Similarities include: development and use of natural resources in a systems context; interaction between private parties and governmental institutions; public policy strongly influencing the outcome of cases; and economic, social, and technologic factors having a marked influence in the way in which rights to the natural resources are allocated or denied. These similarities are common to many natural resources including water. The pattern generally followed by natural resource systems is to pass through successive stages of maturation and decline, moving from unfettered exploitation to legitimation, and then to correction of abuses in exploitation, and on to regulation, and eventually to disintegration. This thesis is propounded with many examples, including some showing various uses of water. (Sears-Florida)
W74-02786

MISSOURI CLEAN WATER LAW.
Missouri Senate Bill no. 424, 76th General Assembly, 1972.

Descriptors: *Missouri, *Water pollution control, *Legislation, *Water quality standards, Water pollution treatment, Governments, Pollution abatement, Pollutant identification, Public health, Effluents, Sewage treatment.

In order to effectuate the public policy of the State of Missouri to conserve the waters of the state and to protect, maintain and improve the quality thereof for public water supplies and for the propagation of wildlife, fish and aquatic life, this bill creates a water contaminant control agency to be known as the Clean Water Commission of the State of Missouri (Commission). The organization and operation procedures of the Commission are fully discussed. The Commission's duties and powers are numerous and detailed. Certain acts are specifically declared unlawful. Procedures to eliminate violations of the act itself and of the rules and regulations of the Commission are discussed in detail and include civil suit for injunctive relief or for assessment of fines up to $5,000 per day for each day or part thereof the violation continues or both, as the court sees fit. The Commission may grant individual variances. The procedure for granting variances and their scope is discussed. (Napolitano-Florida)
W74-02787

A BILL TO ESTABLISHMENT THE MISSOURI BREAKS SCENIC RECREATION RIVER IN THE STATE OF MONTANA.
Senate Bill No. 1009, 93d Cong, 1st Sess, February 26, 1973. 6 p.

Descriptors: *Montana, *Legislation, *Recreation, *Scenery, United States, Natural resources development, River basin development, Administration, Aesthetics, Conservation, Easements, Wild rivers, Tourism.

The Missouri Breaks Scenic Recreation River in the State of Montana, will consist of the waters of the Missouri River and shall not exceed 180,000 acres of land and interests therein along the Missouri River approximately 175 miles from Robinson Bridge to Ft. Benton. The Secretary of the Interior (Secretary) shall administer the river in accordance with the Taylor Grazing Act and any other authority available to him for the management and conservation of natural resources and the protection and enhancement of the environment. After consultation with states and local governments and the interested public the Secretary shall establish a plan for management, and, where suitable, of development for each of the designated areas. He is authorized to enter into cooperative agreements with other federal agencies and with state and local governments for administration of the river. Moreover, the Secretary may issue easements, licenses, or permits for rights-of-way through, over or under the lands in federal ownership within the river, or for the use of such lands or such terms and conditions as he deems necessary. (Mockler-Florida)
W74-02788

A BILL TO AUTHORIZE THE SECRETARY OF THE ARMY TO INVESTIGATE, PLAN, AND CONSTRUCT PROJECTS FOR THE CONTROL OF STREAMBANK EROSION.
House Bill 5470, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *Legislation, *United States, *Bank erosion, *Channel erosion, *Bank protection, Erosion control, Damages, Deterioration, Water control, Sedimentation, Channels, Reservoirs, Easements, Right-of-way, Legal aspects, Planning, Project planning.
Identifiers: *Flood Control Act of 1965.

The proposed bill authorizes the Secretary of the Army, acting through the Chief of Engineers, to investigate, plan, and construct projects for the control of streambank erosion in the United States, its possessions, and the Commonwealth of Puerto Rico, in the interests of reducing damages from erosion, the deposition of sediment in reservoirs and waterways, the destruction of channels and adjacent lands and other adverse effects of streambank erosion. The project shall not be undertaken if its estimated cost exceeds a specified amount, unless specifically authorized by the Congress or under the provisions of the Flood Control Act of 1965. For all projects undertaken pursuant to this proposed bill, appropriate non-federal interests shall provide all lands, easements, and rights of way necessary for the construction of the project; hold and save the United States free from damages due to construction; operate and maintain all completed works in accordance with regulations prescribed by the Secretary of the Army; and provide such additional cooperation as the Secretary of the Army, acting through the Chief of Engineers, deems appropriate. (Reed-Florida)
W74-02789

A BILL TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO STUDY THE FEASIBILITY AND DESIRABILITY OF A BOSTON HARBOR NATIONAL RECREATION AREA IN THE STATE OF MASSACHUSETTS.

Senate Bill No. 211, 93d Cong, 1st Sess, January 4, 1973. 3 p.

Descriptors: *Legislation, *Recreation, *National parks, United States, Scenery, Recreation facilities, Aesthetics, Land use, Natural resources, Scenic highways, Economics, Comprehensive planning, *Massachusetts.

The Secretary of the Interior will conduct a study in order to consider preserving the Boston Harbor area and appropriate segments of adjoining land in their natural condition for public outdoor recreation, and preserving the priceless natural beauty and historic heritage of the area. The Secretary shall consult with other interested federal agencies and the State of Massachusetts and shall coordinate his study with applicable highway plans and other planning activities relating to the Boston Harbor area. In conducting such study and investigation pursuant to this bill, the Secretary of the Interior shall hold public hearings in Massachusetts for the purpose of receiving views and recommendations on the establishment of such a national recreation area. There is authorized to be appropriated a sum, not to exceed $300,000, as may be necessary to carry out the provisions of this bill. (Mockler-Florida)
W74-02790

EVOLUTION OF THE LAW OF THE SEAS--DESTRUCTION OF THE PRISTINE NATURE OF BASIC OCEANOGRAPHIC RESEARCH,
Smithsonian Institution, Washington, D.C.
G. S. Robinson.
Natural Resources Journal, Vol 13, p 504-510, 1973. 3 ref.

Descriptors: *Oceans, *Law of the sea, *International law, *Legal aspects, Research and development, Governmental interrelations, Water law, Jurisdiction.
Identifiers: Territorial jurisdiction, Law of the Seas Conference.

The evolution of the law of the seas is discussed, specifically the overwhelming attack the concept of freedom of the seas is undergoing. The almost unanimous accord which existed prior to World War 11, that the seas extending beyond twelve nautical miles were not subject to the territorial jurisdiction of any state, has dissolved. This is attributed to economics and some rather intricate and sophisticated views of national defense. The presently evolved law is totally inadequate to satisfy the economic standards and needs of the entire international community. The role of the scientific investigator of the oceans within the developing conflict is described. The scientific community is unaware of the seriousness of the forthcoming Law of the Sea Conference as it affects freedom of scientific research. Serious, realistic involvement of scientists is urged so that freedom to conduct scientific research on the high seas will not be bargained away because of inattention. (Gragg-Florida)
W74-02791

FEDERALLY RESERVED RIGHTS TO UNDERGROUND WATER-A RISING QUESTION IN THE ARID WEST,
L. R. Mills.
Utah Law Review, p 43-54, Spring 1973. 67 ref.

Descriptors: *Legal aspects, *Prior appropriations, *Water law, *Reservation doctrine, *Federal-state water rights conflict, Federal reservations, Federal jurisdiction, Reasonable use, Permits, Water sources, Unappropriated water, Water rights, Percolation, Groundwater, Groundwater availability, Surface water availability, Surface water.

The effect of the extension of the federal reservation doctrine on the stability of state water rights is discussed. The federal reservation doctrine dictates that the federal government impliedly reserves at the time of creating a federal reservation or enclave, enough water to fulfill the pur-

poses for which the reservation was created. The development is traced of the prior appropriation doctrine under state law regarding both surface and ground water. The effect of the extension of the doctrine to ground water is described. Such an extension will cause a clear conflict between federal and state interests. A recent case is noted in which a private individual was pumping water from beneath his land in accordance with all relevant Nevada regulations. The United States successfully enjoined this pumping, claiming that it lowered the water level on government land. The uncertainty to adjoining land owners is stressed. (Gragg-Florida)
W74-02792

THE IDAHO SYSTEM FOR THE DISTRIBUTION OF WATER AMONG ITS APPROPRIATORS: AN EXAMINATION AND ASSESSMENT,
N. S. Jensen.
Idaho Law Review, Vol 9, p 187-195, 1973. 42 ref.

Descriptors: *Water users, *Idaho, *Water allocation (Policy), *Distribution patterns, *Prior appropriation, Legal aspects, Irrigation practices, Administration, Distribution preferences (Water rights), Permits, Adjudication procedure, Water management (Applied), Water rights, Water shortage.
Identifiers: Watermaster, Water districts, Unadjudicated rights, Adjudicated rights.

The Idaho system for the distribution of water among its appropriators is examined and assessed. An administrative system for the distribution of water is provided by statute. Varying sized water districts are established each having an elected watermaster. The function of the watermaster is to distribute the water to various diversion points according to the priorities of the respective users. There are significant deficiencies in the statutes governing water distribution. A recent Idaho Supreme Court decision interpreted one statute as eliminating the preference which adjudicated rights had previously enjoyed over unadjudicated rights in times of water shortage. This is an unmitigated disaster to the objective of achieving an orderly system of distribution. The extensive pattern of involvement by the water users in the operation of the administrative apparatus for water distribution is also questioned. (Gragg-Florida)
W74-02793

WATER POLLUTION--THE TENNESSEE RESPONSE; CONCLUSIONS AND GENERALIZATIONS,
Tennessee Univ., Knoxville.
B. D. Fisher.
American Business Law Journal, Vol 11, p 15-35, Spring 1973. 1 tab, 82 ref.

Descriptors: *Legislation, *Legal aspects, *Water pollution control, *Tennessee, Florida, Illinois, Administrative agencies, Permits, Regulation, State governments, Ecology, Water quality control, Water quality standards, Governmental interrelations.
Identifiers: Tennessee Water Quality Control Act.

The effectiveness of administrative agencies charged with the administration of some statutory scheme in controlling water pollution is at present imponderable. However, administrative agencies are potentially more effective pollution control mechanisms than the private enforcers using common law property and tort based remedies, since ongoing agencies staffed with ecology experts can enforce the substantive provisions of various pollution abatement acts. Six factors are cited as existing forces which would undercut the effectiveness of the new Tennessee Water Quality Control Act. Said act is cited for possessing three positive features which other states might consider for their acts. Included is a table comparing the Tennessee Act to acts in Florida and Illinois. States are assigned the prime role under federal water pollution control laws and state success in operationalizing present water quality standards will influence the extent to which further, more stringent federal legislation will be advocated to enhance the nation's water quality. (Sears-Florida)
W74-02794

FEDERAL LEGISLATION REGARDING MARINE POLLUTION,
N. J. Healy.
American Bar Association Section of Insurance, Negligence, and Compensation Law, Proceedings, p 253-260, 1971. 15 ref.

Descriptors: *Oil pollution, *Water pollution, *Oil spills, *United States, *Legislation, Oily water, Water pollution sources, Oil wastes, Legal aspects, Common law, Law of the sea.

There is no federal statute governing civil liability for damage to privately owned or publicly owned property as a result of marine oil pollution. Even the Water Quality Improvement Act of 1970 (WQIA) does not deal with damage to property but deals only with clean-up or removal costs incurred by the government, and the cost of preventive measures undertaken by it. The general maritime law recognizes a right of recovery where there is a willful or negligent discharge of oil from a vessel. Claims for damage to property have always been subject to the Limitation of Liability Statute. The second facet of civil liability concerns responsibility for removal costs and the expense of preventive measures undertaken by the government. The Department of Transportation is charged with the duty of cleaning up oil spills under the WQIA. WQIA imposes liability upon the vessel in rem or owner or operator in personam for the cost of cleanup unless the discharge was caused solely by one of four excepted causes. WQIA amends the Limitation of Liability Statute as to claims by the government under the act. An important feature of WQIA is the provision requiring that a prohibited discharge be reported immediately with failure to do so resulting in fine or imprisonment. (Sears-Florida)
W74-02795

CIVIL LIABILITY OF SHIPOWNERS FOR OIL POLLUTION,
M. Forster.
Journal of Business Law, p 23-31, January 1973. 34 ref.

Descriptors: *Legislation, *Oil pollution, Oil wastes, International law, Liability, Water quality control, Legal aspects, Ships, Oily wastes, Statutes, Jurisdiction.
Identifiers: *England.

In 1971, Parliament enacted the Merchant Shipping (oil pollution) Act which incorporates into United Kingdom Domestic law many of the provisions of the International Convention on Civil Liability for Oil Pollution Damage of 1969. The Act is of very wide operation, and will bind almost every vessel on the seas. The first section places the liability squarely on the owner of the ship, making him chargeable with the statutory tort of causing oil pollution damage. The shipowner is entitled to limit his liability under this section if he can show that the discharge or escape took place without his actual fault or privity. In addition, one of the more striking secondary features of the statute is the number of provisions designed either to consolidate before the courts all actions in respect of a single spillage which relate to damage thereby caused in any or all of the Convention countries. These provisions have the effect of drawing together all actions in respect of pollution damage for adjudication by a single standard and a uniform procedure. (Mockler-Florida)
W74-02796

MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972.

Conference Report No. 92-1546--92d Cong, 2d Sess, October 9, 1972. 18 p.

Descriptors: *United States, *Legislation, *Oceans, *International law, *Waste dumps, Waste disposal, Water pollution sources, Water quality standards, Ultimate disposal, Permits, Regulation, Planning, Law of the sea.

The bill would regulate the dumping of material in the oceans, and coastal and other waters. More specifically, it is the purpose of the bill to regulate the transportation of material from the United States for dumping into ocean waters, and the dumping of material, transported from outside the United States, if the dumping occurs in ocean waters over which the U.S. has jurisdiction or over which it may exercise control, under accepted principles of international law, in order to protect its territory or territorial sea. The Act covers ocean dumping, environmental protection agency permits and procedures, international cooperation, comprehensive research on ocean dumping, and marine sanctuaries. The proposed legislation, as well as the changes made by the Conference Committee are set out along with an explanation of the changes made and the reason for the change. Most of the changes consist of language modification. (Mockler-Florida)
W74-02797

THE PROPOSED INTERNATIONAL COMPENSATION FUND FOR OIL POLLUTION DAMAGE,
L. A. W. Hunter.
Journal of Maritime Law and Commerce, Vol 4, No 1, p 117-139, October 1972. 87 ref.

Descriptors: *Oil pollution, *Water pollution sources, *Legislation, Tankers, Water quality control, Oil spills, Oil wastes, International waters, Exploitation, Disasters, International law, Treaties.

The purposes of an international compensation fund are to provide compensation for pollution damage to the extent that the protection afforded by the 1969 Civil Liability Convention is inadequate and to give relief to shipowners with respect to the additional financial burden imposed on them by the Liability Convention, such conditions being subject to criteria designed to insure compliance with safety at sea and other conventions. The substantive and operational problems arising from the Fund and Liability Convention are so serious that the Convention should not be ratified at this time. Rather, the best method would be to adopt proper and adequate national legislation to work toward a more comprehensive international approach to marine pollution damages. The public must become aware of the devastating ecological and aesthetic consequences which could result from an accident involving oil tankers and the need for adequate legislation to cover such occurrences. (Mockler-Florida)
W74-02799

WATER-WORKS IN CITIES OF SPECIFIED CLASSES OF POPULATIONS.
Ind Ann Stat, secs 48-5418 thru 48-5476 (Supp 1972).

Descriptors: *Indiana, *Legislation, *Water control, Economics, Water distribution, Water supply, Water rates, Water districts, Water conveyance, Flood control, Utilities.

These are the Indiana annotated statutes dealing with water-works in cities of specified classes of populations. The statutes provide for the issuance and sale of revenue bonds, the management and control of water-works commissions and agencies, authorization to borrow from the flood control

revolving fund, and authorizations required by the Public Service Commission. The provisions deal principally with the department of water-works (department), in cities of the second class, defining the department's powers and duties and providing for the creation of water-works taxing districts consisting of such cities. Although some of the regulations are permissive, the more important are mandatory and specifically delineate the powers and duties conferred. Case citations, annotations, and the legislative history are included with each section of the statutes; in addition, subsequent amendments to the Act have also been included. (Mockler-Florida)
W74-02802

INDIANA DRAINAGE CODE--DRAINAGE BOARDS--POWERS AND DUTIES.
Ind Ann Stat, secs 27-2001 thru 27-2017 (1970).

Descriptors: *Indiana, *Legislation, *Drainage, Drainage districts, Administration, Governments, Soil-water-plant relationships, Drainage engineering, Water policy, Land use, Wildlife conservation, Drainage systems.

The statutes provide rules, regulations, and guidelines covering the creation of county drainage boards, membership of the boards, organization and other administrative functions, appointment and compensation of members, filing of petitions, duties of the county surveyor, classification of legal drains in counties, proceedings to vacate legal drains, procedures for notice of proposed improvements, considerations in determining benefits to land, joint boards, and disqualification of board members for conflicts of interest. In addition, numerous definitions applicable to a complete understanding of the act are given, as well as case citations, annotations, and legislative history. (Mockler-Florida)
W74-02803

CANAL COMPANIES.
17 Ga Code Ann, secs 101 thru 107 (Supp 1972).

Descriptors: *Georgia, *Legislation, *Canals, Channels, Transportation, Water conveyance, Structures, Engineering structures, Water quality control, Legal aspects.

The Statutes deal with the petition for incorporation, payment of fees, certificate of incorporation, petition for charter to be kept on file, principal office requirements, general corporate powers, and the increase or decrease of capital stock of canal companies. The Statutes provide that any number of persons, not less than five, desiring to be incorporated as a company for the purpose of constructing, operating, and maintaining a canal, may file with the Georgia Secretary of State a petition setting out the following: the names and domiciles of the petitioners, that they desire to be incorporated as a canal company, the name under which they desire to be incorporated, the route of the proposed canal, the headquarters of the corporation, the amount of the capital stock, and the number of shares to be issued. Upon receipt of the petition and a filing fee of $100.00, the Secretary of State will issue a certificate of incorporation. Upon the issuance of this certificate, the persons shall become a body corporate for 30 years. (Mockler-Florida)
W74-02804

GULF HOLDING CORP. V. BRAZORIA COUNTY (ORDER ENJOINING LANDOWNER FROM OBSTRUCTING PUBLIC USE OF BEACH).
497 S.W.2d 614-619 (Texas 1973). 5 p.

Descriptors: *Littoral, *Judicial decisions, *Gulf of Mexico, *Land tenure, *Public access, Easements, Public rights, *Texas, Legal aspects, Legislation, Beaches, Recreation, Water sports.
Identifiers: Texas Open Beach Act, Injunctive relief.

The defendant, a littoral landowner, appealed from an injunction enjoining him from obstructing public use of a beach on the Gulf of Mexico. The plaintiff, State of Texas, based its claim on the Open Beach Act, an implied common law dedication to public use, and an easement for public use by prescription. This appeal was from an interlocutory order and was mainly concerned with the authority claimed through the Open Beach Act (Act). The defendant claimed that the Act was not applicable to the beach in question. The Court of Civil Appeals of Texas interpreted the Act and found it applicable. The court ruled that the mandatory injunction to remove the obstruction was also proper under the Act. The court further stated that when the case was tried on the merits the plaintiffs would not be restricted to basing their claims only on the Act. They shall also have the right to urge alternate theories of law. (Gragg-Florida)
W74-02805

PIERCE V. DE JONG (ACTION BY OWNERS OF DOMINANT ESTATE AGAINST OWNERS OF SERVIENT ESTATE FOR DAMAGES FOR OBSTRUCTION OF NATURAL FLOW OF SURFACE WATERS).

300 N.E.2d 782-785 (Ill. App. Ct. 1973). 4 p.

Descriptors: *Judicial decision, *Surface drainage, *Natural flow doctrine, *Obstruction to flow, Surface runoff, *Illinois, Natural flow, Runoff, Groundwater movement, Surface water, Land tenure.
Identifiers: Injunction, Dominant tenament, Servient tenament.

Plaintiff secured a monetary judgment against defendant for obstructing the natural flow of surface water from the plaintiff's adjoining property. The obstruction caused the water to back up on plaintiff's adjoining property damaging trees, shrubs and making the property unusable. The Appellate Court of Illinois affirmed and held that the owner of the dominant estate was entitled to uninterrupted flow of surface waters from their property across the lower of servient land. The Appellate Court however found the damages awarded to be excessive and reduced them accordingly. (Gragg-Florida)
W74-02806

SOUTHERN MUTUAL INVESTMENT CORPORATION V. LANGSTON (SUIT FOR DAMAGES RESULTING FROM DIVERSION OF SURFACE WATERS).

197 S.E.2d 775-778 (Ga. App. Ct. 1973). 4 p.

Descriptors: *Judicial decision, *Surface water, *Surface drainage, *Bank erosion, *Discharge, *Georgia, Groundwater movement, Runoff, Penalties, Accelerated erosion, Damages, Discharge frequency, Construction.
Identifiers: Monetary damages.

Plaintiffs, landowners whose property bordered a small stream, secured a monetary judgment against the defendant owner of an apartment located on the other side of the creek. The plaintiffs contended that the defendant had altered the terrain so as to erode the plaintiffs' premises. The Court of Appeals of Georgia in upholding the judgment stated the general rule is that one land proprietor has no right to concentrate, collect, and discharge surface water by artificial means upon a lower proprietor in a manner different from that which the water would be received by the lower estate. This is based upon the principle that water has a time relation, as well as a space relation, both of them being fixed by nature. The Appellate Court affirmed the measure of damages as being the cost of repairing the damage to the property. It recognized that this was an exception to the general rule as to measurement of damages which is the difference in value before and after the injury to the premises. (Gragg-Florida)
W74-02807

CLEMSON UNIVERSITY V. FIRST PROVIDENT CORPORATION (SUIT TO ENJOIN TRESPASS UPON SERVIENT LANDS).

197 S.E.2d 914-921 (S.C. 1973). 8 p.

Descriptors: *Judicial decisions, *Easements, *Surface drainage, *Drainage, *Excavation, Condemnation, *South Carolina, Right-of-way, Trespass, Ditches, Legal aspects, Constitutional law, Surface water.
Identifiers: Injunctive relief.

Appellant, a residential property developer, appealed from an injunction which enjoined him from clearing any right of way and constructing, digging or extending any drainage ditch and from committing any trespass upon the property of the respondent adjoining property owners. Prior to the development of appellant's property the surface drainage water therefrom flowed into a ditch which crossed the respondent's land. Because of the development additional drainage became necessary and the developer negotiated with the various owners of property along the ditches for a right of way to enlarge the ditch. The appellant failed to get such right of way from the respondents, but nevertheless began clearing a right of way and enlarging the ditch. The appellant's appeal from the injunction was based on three claims: the right to an easement by prescription, the right to an easement by implication and right of necessity, and the applicability of a state statute which provides for a landowner the right to cut a ditch across the land of another where his land cannot be properly drained. The Supreme Court of South Carolina in affirming declared the statute unconstitutional as an improper taking of private property for a private use. The court also failed to find an easement by implication. Although the court admitted the possibility of a prescriptive easement, it found the present action to be an improper enlargement of such easement. (Gragg-Florida)
W74-02808

HARTHMAN V. WITTY (APPEAL FROM DISTRICT COURT ORDER DENYING MOTION FOR ASSESSMENT OF DAMAGES AGAINST SHOPPING CENTER FOR VIOLATION OF INJUNCTION AGAINST POLLUTION OF STREAM).

480 F.2d 337-340 (3rd Cir. 1973). 4 p.

Descriptors: *Riparian rights, *Sewage, *Judicial decision, *Water pollution sources, *Water pollution treatment, Domestic wastes, Sewage effluents, Sewage treatment, Law enforcement, Penalties, Water quality, *Virgin Islands.

The plaintiff, a lower riparian land owner, had secured a permanent injunction and received damages on a per diem basis against the defendant who had polluted a stream. The defendant owned a shopping center and through the operation of an inadequate sewage treatment plant caused insufficiently processed effluent to be discharged into the stream. Although the defendant had improved the sewage treatment plant so as to avoid the discharge of insufficiently processed effluent a malfunction caused a discharge which contained more soapy waste than was within tolerable limits. The United States Court of Appeals found that the permanent injunction which was outstanding not only applied to the pollution of which the plaintiff originally complained but was broad enough to en-

compass the subsequent pollution. The court however refused to grant the plaintiff per diem damages for the subsequent pollution as this penalty had been fashioned in the light of the gravity of the defendant's original pollution. (Gragg-Florida)
W74-02809

U.S. V. VALLEY CAMP COAL COMPANY (VIOLATION OF FEDERAL STATUTE PROHIBITING DISCHARGE OF REFUSE MATTER INTO NAVIGABLE WATERS).
480 F.2d 616-617 (4th Cir. 1973). 2 p.

Descriptors: *Judicial decision, *Industrial wastes, *Water pollution control, *Navigable waters, *Coal mine wastes, Pollution abatement, Penalties, Law enforcement, Water pollution, Tributaries, *West Virginia.
Identifiers: Refuse Act of 1899.

The defendant, Valley Camp Coal Company, appeals from a fine imposed for violation of a federal statute that makes it unlawful to throw, discharge, or deposit, or cause, suffer, or procure to be thrown, refuse matter into a tributary from which such refuse was floated and washed into a navigable water of the United States. The defendant appealed, claiming that to be found guilty it must be shown that the defendant directed a discharge of the refuse whereas the evidence only tended to show that the company caused refuse matter to be deposited on the shore of the tributary, which waste matter was subsequently washed into the tributary by rain. The United States Court of Appeals rejected the defendant's contention and held that the statutory offense described was made out by proof of depositing refuse matter on the shore of the tributary and the subsequent washing of the same by rainfall into the tributary. (Gragg-Florida)
W74-02810

RED HOOK MARINA CORPORATION V. ANTILLES YACHTING CORPORATION (ACTION TO RECOVER UNPAID BALANCE ON NOTE AND TO FORECLOSE PURCHASE MONEY MORTGAGE).

478 F. 2d 1273-1276 (3rd Cir. 1973). 4 p.

Descriptors: *Virgin Islands, *Judicial decisions, *Property boundaries, *Boundary dispute, *Metes and bounds, *Ownership of beds, Legal aspects, Shores, High water mark, Low water mark, Federal government, Coasts, Seashores, Oceans.
Identifiers: Caribbean Sea, Boundary calls, Title cloud.

Plaintiff foreclosed a mortgage on a piece of seafront land in the Virgin Islands. The defendant counterclaimed for damages for alleged breach of plaintiff's warranties of title. The case revolves around the description of the land in the deed. One of the metes and bounds used in the deed was a distance of 294 feet to the sea. The court found that boundary calls to the sea and along the sea will prevail over any conflicting call for specified distances. The final issue involved whether the plaintiff had purported to convey the land to the low water mark because if so a cloud would be raised on the title by way of the United States or the Government of the Virgin Islands having superior title in the portion of the land between the high and low water marks. The court found that the deed which the defendant received from the plaintiff conveyed only that land above the high-water mark and thus the title of the government cast no cloud on the deed. (Gragg-Florida)
W74-02811

PUBLIC USE OF PRIVATE LANDS AND WATERS.

Iowa Code Ann, secs 111C.1 thru 111C.7 (Supp 1973).

Descriptors: *Iowa, *Public access, *Recreation, *River systems, Boating, Natural resources, Resonable use, Recreation facilities, Use rates, Water policy, Scenic easements, Administrative agencies, Rivers, Conservation, Public benefits, Legal aspects, Negligence, Hazards, Risks, Water law, Public health.
Identifiers: Public trust doctrine, Water right (Non-riparian), Notice.

Generally, an owner of land owes no duty to keep the premises safe for entry or use by others for recreational purposes, nor is there a duty to give any warning of a dangerous condition, structure or activity on the premises. The owner is liable however, for any willful or malicious failure to warn against dangerous conditions, or for injury suffered in any case where the owner charges for entry upon his land. Thus, by permitting people to use his land for recreational purposes, the owner extends no assurance that they are safe, nor assumes liability for any injury. Various state agencies may acquire conservation easements by gift, purchase or lease, but not by condemnation. The Iowa State Conservation Commission may designate for inclusion in the scenic rivers system any river in the state which possesses outstanding conservation or recreation possibilities. Any nonresident of the State who operates a watercraft on the waters of the state shall be deemed to appoint the Secretary of State as his agent for service growing out of any suit resulting from such use. (Glickman-Florida)
W74-02812

RURAL WATER DISTRICTS.

Iowa Code Ann, secs 357A. 1 thru 357A. 20 (Supp 1973).

Descriptors: *Iowa, *Water districts, *Administrative agencies, *Water, Water law, Water policy, Legislation, Water demand, Water supply, Water storage, Water requirements, Public health, Rural areas, Legal aspects, Regulations, Structures.

A petition may be filed with the county auditor requesting the supervisors to organize a water district for the purpose of providing an adequate water supply for domestic purposes. The district is to serve the residents of an area who are not served by the water mains of any city, and who cannot obtain adequate supplies from wells. A hearing is to be held on the petition, and any landowner or occupant may be heard. If the County Board of Supervisors (Board) finds that the water district is reasonably necessary for the public health, convenience, fire protection and comfort of the residents of the district, they shall establish it. The Board of Supervisors shall also provide for a board of directors to govern the district. The board of directors shall adopt rules, regulations and rate schedules for the conduct of the district's business. It will also have the authority to acquire by lease or purchase any property, and also to construct and maintain facilities for the storage, transportation or utilization of water needed to effect the purposes of the water district. (Glickman-Florida).
W74-02813

DRAINAGE DISTRICTS IN CONNECTION WITH UNITED STATES LEVEES.
Iowa Code Ann. secs. 466.1 thru 466.8 (1971).

Descriptors: *Iowa, *Levee district, *Drainage district, *Governmental interrelations, Federal government, Local governments, Structures, Water policy, Assessments, Taxes, Drainage programs, Water law Administrative agencies, Legislation, Government finance, Planning, Navigable waters.

Wherever the United States builds a levee along the bank of a navigable stream forming a part of the boundary of a state, the county board of supervisors of any county affected may aid in obtaining the right of way for a maintaning said levee. The board shall also provide a system of internal drainage if made necessary by the construction of the levee. The board may also incorporate the levee as part of the plan of any drainage district, and by agreement with the United States, provide for payment of an equitable portion of the cost. The costs and expenses incurred shall be assessed against and collected from the lands lying within the proposed district. In the establishment and maintenance of levee and drainage districts in cooperation with the United States, all proceedings relating to the district shall follow the law as provided in the subject statutes. (Glickman-Florida)
W74-02814

UNITED STATES V. KENTLAND-ELKHORN COAL CORPORATION (INJUNCTIVE RELIEF SOUGHT AGAINST DEFENDANT TO CAUSE CESSATION OF BLACKWATER DISCHARGE INTO FEDERALLY PROTECTED WATERS).
353 F. Supp. 451-457 (E.D. Ky. 1973).

Descriptors: *Water pollution, *Coal mine wastes, *Water pollution sources, Navigable streams, Federal pollution control, Environmental effects, *Kentucky, Coal mines, Water quality, Bituminous materials, Waste water disposal.
Identifiers: Injunctive relief.

Plaintiff, federal government, brought a civil action seeking injunctive relief against the defendant coal corporation. Plaintiff sought cessation of the alleged continuing discharges of black-water into waters under the protection of the federal government. At issue was the alleged pollution by the defendant of Fishtrap Lake, a federal flood control project. Many streams feed into the project, one of which runs along the coal mines of defendant. The evidence described the operation of the coal washing plant in the valley. The coal washing plant used water from the nearby stream, though there was no evidence of the frequency of use of the plant. The district court held that there was insufficient evidence to warrant a preliminary injunction, but the corporation had to permit representatives of the government to make a reasonable examination of the tributary of the navigable stream along the premise of the corporation for evidence of water pollution. (Daniels-Florida)
W74-02815

DRAINAGE DISTRICTS.

La. Const., art. 15, secs. 1 and 4, p. 139-144 (Supp 1973).

Descriptors: *Drainage districts, *Legislation, *Louisiana, *Marshes, taxes, government finance, Operating costs, Water resources development, Groundwater resources, Comprehensive planning, State governments, Wetlands, Swamps. Water utilization.

Necessary legislation may be enacted to provide for the drainage and reclamation of the undrained lands within the state including marsh, swamp and overflow lands. Creation and organization of drainage and sub-drainage districts is also authorized. A fresh water district known as the Lake Water Conservation District (District) is hereby created. The District shall be governed by a Board of Commissioners. The District is created for the purpose of making available an adequate fresh water supply for industrial and other consumption. The District is authorized to furnish fresh water to cities, towns, villages, industries, corporations and persons both within and outside of the District; to preserve, store, control, conserve, utilize and distribute the waters in the District; and to prevent the pollution and blocking of streams. The District is also to prevent contamination; to acquire, maintain and operate facilities

necessary to the drainage of lands in the District; to prevent the escape of any such waters until employed to the maximum advantage of the public, generally in aiding the development of agriculture, commerce and industries; and to act as to insure a fair and just distribution of all of said waters for all of the people of the area. (Silber-Florida)
W74-02816

LAKE SKANEATELES--SEWAGE, GARBAGE DUMPING PROHIBITED.
N.Y. Sess. Laws, Ch. 60, secs 1153 through 1153-a, (McKinney 1972).

Descriptors: *New York, *Legislation, *Sewage disposal, *Pollution abatement, *Water pollution, Environmental sanitation, Pollution abatement, Water pollution control, Lakes, Public health.

This statute amends a New York statute by extending a prohibition against discharging sewage and other offensive matter and depositing garbage or other refuse into Skaneateles Lake and its tributaries. The local Board of Health shall have jurisdiction and shall cause violations to be abated by injunction or otherwise. The discharging of sewage is a misdemeanor punishable by a fine of not more than five hundred dollars or by imprisonment for not more than one year or by both. The punishment for depositing garbage or other refuse is a fine of not more than fifty dollars. (Gragg-Florida)
W74-02817

NORTH GEORGIA PETROLEUM COMPANY V. LEWIS (ACTION BY PROPERTY OWNER SEEKING DAMAGES FOR POLLUTION OF WATER SUPPLY AND BY STATION OPERATOR AGAINST GASOLINE COMPANY FOR LOSS OF PROFITS).
197 S.E. 2d 437-440 (Ct. App. Ga. 1973).

Descriptors: *Georgia, *Water pollution, *Gasoline, *Streams, *Wells, Percolating water, Trespass legal aspects, Riparian rights, Water table, Negligence, Judicial decisions, Damages.

Plaintiff property owner brought an action for damages against a gasoline company and gasoline station lessee for contamination of the wells on his farm from leaking gasoline tanks. The appellate court affirmed the damages for the plaintiff, noting that 21 states have recognized that pollution of underground supplies of percolating water by oil or gasoline render the person responsible liable for damages to the aggrieved landowner. The court stated that a Georgia statute barring trespass action for supposed interference with rights of proprietor of underground stream deals specifically with the riparian rights of the owner of the water in an underground stream and does not prohibit an action for damages for pollution or poisoning of the ground, the water table or underground waters. It was held that where there was contamination without use a landowner who is putting his land to a reasonable use is not liable to the owner of neighboring land for the pollution of percolating water unless he has been quilty of negligent conduct. (Sears-Florida)
W74-02818

DISPOSAL OF WASTE MATERIALS AT SEA.
N.J. Stat. Ann., secs 58:10-1 through 58:10-23.31. (1972).

Descriptors: *Water pollution, *Water pollution control, *Abatement, *New Jersey, Food processing industry, Tannery wastes, Toxins, Wastes, Water quality, Potable water, Public health, Penalties, Ban enforcement, Regulation, Acts of God, Administrative Agencies, State governments, Permits, Oil, Banks oil pollution, Rivers, Oceans, Sewage effluent.

Identifiers: *Coastal waters, *Administrative regulations, Standing (Legal), Intentional torts, Injunctive relief, Litter, Licenses, Ship loading.

The New Jersey Water Quality Improvement Act (Act) prohibits the placing or discharging of pollutants into certain waters or on their banks above a municipal water supply intake. The Act provides penalties and injunctive relief. There can be multiple offenses for a continuing violation. Standing is granted to health departments or public bodies supplying potable water whose supplies have been affected by a violation. A compromise provision is provided in all sections. Enforcement of the Act may be by summary court proceeding. A subsequent section of the Act empowers the New Jersey Department of Environmental Protection (Department) to require the prompt containment and removal of discharges of petroleum products, debris, and other hazardous substances. If a responsible person fails to remove an illegal discharge he can be assessed the costs of its removal by the department or an authorized third party not exceeding $14,000,0000 unless wilful negligence or misconduct is shown. A third section of the Act allows the commissioner of the Department to formulate rules and issue permits. He can prevent and control the loading of a vessel and the handling of any materials which if dumped at sea would have adverse environmental effects. (Weh-by-Florida)
W74-02819

THE EFFECTS OF AUTHORIZATION FOR WATER IMPOUNDMENTS ON SHORELAND TRANSITION,
North Carolina Univ., Chapel Hill. Center for Urban and Regional Studies.
For primary bibliographic entry see Field 06B.
W74-02826

SEWERAGE FACILITIES PLAN, IN ACCORDANCE WITH THE PENNSYLVANIA SEWERAGE ACT (537).
Delaware County Planning Commission, Media, Pa.
For primary bibliographic entry see Field 05D.
W74-02832

PUBLIC POLICY ALTERNATIVES AFFECTING WATER AND SEWER SERVICE IN URBAN GROWTH AREAS.,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 03D.
W74-02835

WATER QUALITY MANAGEMENT: NEW JERSEY'S VANISHING OPTIONS.
New Jersey County and Municipal Government Study Commission, Trenton.
For primary bibliographic entry see Field 05G.
W74-02841

WATER-RESOURCES PLANNING,
For primary bibliographic entry see Field 06B.
W74-02843

SUMMARY OF THE SOUTHERN TIER EAST REGIONAL PLAN, BROOME AND TIOGA COUNTIES, NEW YORK.
Egner and Niederkorn Associates, Inc., Ithaca, N.Y.
For primary bibliographic entry see Field 06B.
W74-02844

MASTER PLAN FOR WATER SUPPLY AND WASTEWATER MANAGEMENT IN LUZERNE COUNTY, PENNSYLVANIA; VOLUME I--GENERAL, SEWERAGE PLANNING, APPENDICES.
Gilbert Associates, Inc., Reading, Pa.

County of Luzerne, Pennsylvania, January 31, 1973. 247 p, 39 fig, 59 tab, 7 appendices.

Descriptors: *Regional analysis, *Sewerage, *Water supply, *Planning, *Future planning (Projected), Water supply development, Sewers, Sewage treatment, Pennsylvania, Water resources development, Urbanization, Municipal water, Comprehensive planning, Water quality.
Identifiers: *Luzerne County (Pennsylvania).

The first master water supply and sewerage plan for Luzerne County, Pennsylvania is presented. This volume covers general aspects of water and sewage facilities in Luzerne County and the details of planning for sewerage facilities. Luzerne County was found to be (organizationally) quite advanced in both water supply and wastewater disposal. Most of the County's population receives water supply from the Pennsylvania Gas and Water Company, an investor-owned company, and sewerage service from the Wyoming Valley Sanitary Authority. Both of these organizations operate massive regional systems in the Wyoming Valley which comprises about 70 percent of the County's population. The consultants main conclusion was that difficulties must be anticipated in implementing the County's master plan because coordination, priorities and costs must be divided between private utility companies and the various public agencies involved. It is recommended that the water planning of the Pennsylvania Gas and Water Company be coordinated with the serwerage planning of the Wyoming Valley Sanitary Authority, through the master plan of the Luzerne County Planning Commission. Several alternative means for accomplishing this coordination are presented. It is recommended that the County upgrade the sewage treatment plant of the Wyoming Valley Sanitary Authority to provide treatment. This is necessary for economic progress in the Valley, for improvement in water quality in the Susquehanna River and for improvement of water uses downstream from the point of effluent discharge in Hanover Township. (See also W74-02862) (Poertner)
W74-02861

MASTER PLAN FOR WATER SUPPLY AND WASTEWATER MANAGEMENT IN LUZERNE COUNTY, PENNSYLVANIA: VOLUME 2--WATER PLANNING.
Gilbert Associates, Inc., Reading, Pa.

County of Luzerne, Pennsylvania, January 31, 1973. 277 p, 20 fig, 16 tab, 3 appendices. HUD Planning Grant.

Descriptors: *Regional analysis, *Water supply, *Sewerage, *Planning, *Future planning (Projected), Water supply development, Sewers, Sewage treatment, Pennsylvania, Water resources development, Urbanization, Municipal water, Comprehensive planning.
Identifiers: *Luzerne County (Pennsylvania).

The first master water supply and sewerage plan for Luzerne County, Pennsylvania is presented. This volume covers planning for water supply. Luzerne County was found to be (organizationally) quite advanced in both water supply and wastewater disposal. Most of the County's population receives water supply from the Pennsylvania Gas and Water Company, an investor-owned company, and sewerage service from the Wyoming Valley Sanitary Authority. Both of these organizations operate massive regional systems in the Wyoming Valley which comprises about 70 percent of the County's population. The consultant's main conclusion was that difficulties must be anticipated in implementing the County's master plan because coordination, priorities and costs

must be divided between private utility companies and the various public agencies involved. It is recommended that the water planning of the Pennsylvania Gas and Water Company be coordinated with the sewerage planning of the Wyoming Valley Sanitary Authority, through the master plan of the Luzerne County Planning Commission. Several alternative means for accomplishing this coordination are presented. Other recommendations include: (1) encourage cooperation between publicly-owned and investor-owned suppliers of water to achieve master water supply planning goals; (2) develop a modern water supply system where needed in the rapidly developing Back Mountain Area; and (3) actively encourage and support a long-term solution to the water shortage experienced in the Greater Hazleton Community Area. (See also W74-02861) (Poertner)
W74-02862

THE LEGAL AND REGULATORY FRAMEWORK FOR THERMAL DISCHARGE FROM NUCLEAR POWER PLANTS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W74-02875

SUMMARY OF LEGISLATIVE AND REGULATORY ACTIVITIES AFFECTING THE ENVIRONMENTAL QUALITY OF NUCLEAR FACILITIES.
For primary bibliographic entry see Field 05G.
W74-02890

PETROLEUM SYSTEMS RELIABILITY ANALYSIS, VOLUME I - ENGINEERING REPORT, A PROGRAM FOR PREVENTION OF OIL SPILLS USING AN ENGINEERING APPROACH TO A STUDY OF OFFSHORE AND ONSHORE CRUDE OIL PETROLEUM SYSTEMS,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
For primary bibliographic entry see Field 05G.
W74-02947

INTRODUCTION TO LEGAL, LEGISLATIVE AND REGULATORY SESSION OF NATIONAL ENVIRONMENTAL PROTECTION SYMPOSIUM,
Library of Congress, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-03048

ENVIRONMENTAL LAW INFORMATION SYSTEM,
Aspen Systems Corp., Colo.
For primary bibliographic entry see Field 10B.
W74-03049

LEGAL BIBLIOGRAPHY: A CRITICAL OVERVIEW,
Utah Univ., Salt Lake City. Coll. of Law.
For primary bibliographic entry see Field 10C.
W74-03050

DOCUMENT SERVICES AND REFERRAL ACTIVITIES IN THE LEGAL, LEGISLATIVE, AND REGULATORY AREA,
Congressional Information Service, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-03051

OREGON'S LONG-RANGE REQUIREMENTS FOR WATER.
Oregon State Water Resources Board, Salem.
For primary bibliographic entry see Field 06D.
W74-03119

PRESERVATION OF RESERVOIR SITES,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 06F.
W74-03123

WATER, LAND, AND ENVIRONMENT IMPERIAL VALLEY: LAW CAOUGHT UP IN THE WINDS OF POLITICS,
California Univ., Berkeley.
P. S. Taylor.
Natural Resources Journal, Vol 13, No 1, p 1035, January, 1973.

Descriptors: *Water utilization, *Irrigation, Land reclamation, Water, Irrigation districts, Irrigation canals, Government, *California, Judicial decisions.
Identifiers: *National Reclamation Act (1902), *Imperial Valley (Ca.), Public water, All American Canal.

Under the provisions of the National Reclamation Act of 1902, the sale of water use rights for publically financed irrigation works and reservoirs to land in private ownership is prohibited to landowners of tracts exceeding 160 acres and to landowners not bona fide residents of the tract or residing in the neighborhood. Beginning with the construction of the Boulder Canyon Project and the All-American Canal to service the Imperial Valley, controversy has continued over the applicability and enforcement of this law in the Imperial Valley. The arguments and effects of political suasion on administrative, congressional, and judicial review of the situation are traced. The resulting near-paralysis of public water policy highlights the fact that the availability of proper procedures within each branch of government does not assure equitable protection of diverse interests and preservation of public policy. Currently 2 opposing administrative rulings on the applicability of the law are matched by 2 opposed district court rulings. The outcome is pending on appeal. (Hoffman - North Carolina)
W74-03127

NEED TO IMPROVE ADMINISTRATION OF THE WATER POLLUTION RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.
General Accounting Office, Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-03131

LAYING OUT, ALTERING AND DISCONTINUING HIGHWAYS.

Me. Rev. Stat. Ann., Chap. 11, Tit. 23/Section 651-652 (Supp. 1972-73).

Descriptors: *Highways, *Road construction, *Drainage, *Maine, Ditches, Water supply, Highway relocation, Damages, Legal aspects, Legislation, Highway effects, Impaired water use, Impaired water quality.

The State Highway Law of Maine gives the planning commission the authority to alter, widen or change any state highway whenever in its judgement the public exigency may require. The commission may preserve and develop the natural scenic beauty along state highways. The commission has authority to construct ditches and drains to carry water away from any highway under its supervision. Whenever changes made by the commission causes injury to an owner of adjoining land, the landowner has a right to damages. If an owner of land adjacent to a state road finds that a private water supply has been destroyed by the commission constructing, reconstructing or maintaining the highway, he may file for damages within two years and may be granted replacement or repair of water supply or money changes. (Daniels-Florida)
W74-03132

A BILL TO AMEND THE ACT OF MARCH 3, 1899, COMMONLY REFERRED TO AS THE REFUSE ACT RELATING TO THE ISSUANCE OF CERTAIN PERMITS.
House Bill 3105, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *Waste disposal, *Navigable waters, *Environmental control, Legislation, United States, Water pollution, Rivers and Harbors Act, Permits, Administrative agencies, Environmental effects, Disposal, Wastes.

The Refuse Act provisions for the construction, repair, and preservation of certain public works on rivers and harbors were amended so that whenever in the judgment of the chief of engineers anchorage and navigation will not be injured thereby, the Administrator of the Environmental Protection Agency (EPA) may permit the deposit of any material in navigable waters within limits defined. In places where harbor lines have not been established, and where deposit of debris of mines or stamp works can be made without injury to navigation, the Administrator of the EPA may cause such lines to be established under regulations prescribed by him. (Daniels-Florida)
W74-03134

WHAT ABOUT WATER.
A Staff Survey--Subcomm on Science, Research, and Development--Comm on Science and Astronautics, U.S. House of Representatives, 92d Cong, 2d Sess, December 1972. 59 p, 1 map, 2 illus, 5 photo, 4 tab.

Descriptors: *Legislation, *Water resources development, *Water conservation, *Federal Government, Water resources, Hydrologic aspects, River basin development, Administration, Comprehensive planning, Governments, Local governments, Planning, Project purposes, Regional development, Water allocation (Policy), Water law, Water supply, Water utilization, *Research and development.

An inventory is presented of who is doing what on water research in the Federal Government, selected States, various local agencies and some private industries. A brief analysis of the science of river basin planning is included. The survey has shown that as water conservation requirements become steadily more acute, as attendant environmental problems increase and as priorities change in the use of water, new research is being undertaken by many institutions in an effort to improve the state-of-the-art. The following agencies of the United States Government are considered in the report: Office of Water Resources Research, U.S. Geological Survey, Bureau of Reclamation, Army Corps of Engineers, Office of Saline Water, Bureau of Sport Fisheries and Wildlife, Environmental Protection Agency, Agricultural Research Service, Soil Conservation Service, Office of Science and Technology, National Water Commission, Water Resources Council, Tennessee Valley Authority, National Aeronautics and Space Administration, National Science Foundation, Smithsonian Institution, National Oceanic and Atmospheric Administration, National Bureau of Standards and the National Academy of Sciences. Representative agencies from the States of California, Colorado and Maryland are also discussed. (Reed-Florida)
W74-03135

THE UNIVERSITY AND PUBLIC POLICY IN WATER RESOURCES, PROCEEDINGS UCOWR ANNUAL MEETING HELD JULY 29-AUGUST 1, 1973 AT TEXAS TECH UNIVERSITY, LUBBOCK, TEXAS.
For primary bibliographic entry see Field 06B.
W74-03172

IMPLICATIONS OF THE NATIONAL WATER COMMISSION REPORT FOR THE UNIVERSITIES COUNCIL ON WATER RESOURCES,
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06B.
W74-03173

COMMENTS ON THE REPORT OF THE NATIONAL WATER COMMISSION,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-03174

POLICY ISSUES RELATED TO URBANIZATION,
Colorado Univ., Boulder. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06B.
W74-03178

WATER QUALITY ISSUES IN THE NATIONAL WATER COMMISSION'S REPORT 'WATER POLICIES FOR THE FUTURE',
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 06B.
W74-03179

INSTITUTIONAL PROBLEMS IN THE WATER RESOURCES FIELD,
Rutgers - The State Univ. Princeton, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W74-03183

A CHALLENGE TO THE ACADEMIC COMMUNITY: ECONOMICS AND INSTITUTIONS IN THE REPORT OF THE NATIONAL WATER COMMISSION,
New York State Coll. of Agricultural and Life Sciences, Ithaca. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W74-03184

A STATE/LOCAL LAKE REHABILITATION PROGRAM: A PROPOSED BILL AND COMMENTARY,
Wisconsin Univ., Madison. Inland Lake Demonstration Project.
For primary bibliographic entry see Field 05G.
W74-03196

THE 200 MILES FISHING RIGHTS CONTROVERSY: ECOLOGY OR HIGH TARIFFS,
Universidad Autonoma de Nuevo Leon, Monterey (Mexico). Faculty of Economics.
D. C. Edmonds.
Inter-American Economic Affairs, Vol 26, No 4, p 3-18, 1973. 1 fig.

Descriptors: *Marine fisheries, *Tariffs, *International waters, Foreign trade, Commercial fishing, Political constraints.
Identifiers: Soverneignty, Chile, Ecuador, Peru, Coastal zone, Anchovies, Bonita, Tuna.

In 1952, Chile, Ecuador, and Peru (CEP) jointly declared sovereignty over marine resources in their offshore 200 nautical mile zones. A number of incidents between foreign fishing vessels and the three countries have occurred as a result. Official statements of the three countries have insisted that conservational concerns motivated the action. While such concerns contain validity it is postulated that the 200 mile declaration was not chiefly motivated by conservation attempts. The rejection by the three countries of international agreements and policing of conservation policies suggests that the countries had other motivations. Two alternatives are examined. First, the move may be a countermeasure to existing restrictive import tariffs which have prevented development of export industries using tuna and bonita catches of the three countries. Secondly, the 200 mile limit may reflect the fear that foreign vessels will be able to exploit the marine resources of the coastal areas, even in the face of international conservation policies while the three countries are excluded from market competition. The continued public eschewal of the tariff question may allow CEP to maintain greater national support for the limitation than might otherwise exist. Nationalistic tendencies have also lent support to the continuation of the present policy. (Schroeder-Wisconsin)
W74-03200

6F. Nonstructural Alternatives

ECONOMIC CRITERIA FOR DECISIONS ON PRESERVATION AND ALTERATION OF NATURAL RESOURCES WITH SPECIFIC REFERENCE TO FRESHWATER WETLANDS IN MASSACHUSETTS,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 06B.
W74-02671

SAN DIEGO'S OFFSHORE AREA,
San Diego City Planning Dept., Calif.
T. Sasaki, and A. Muller.
May, 1969. 53 p, 4 fig, 11 maps, 24 ref.

Descriptors: *Water allocation (Policy), Oceanography, Competing uses, Equitable apportionment, Water users, *California.
Identifiers: *Use-priority system, *San Diego (Calif), Offshore areas.

The offshore area of San Diego is utilized for a diverse range of activitiees: sport fishing; military oceanics; academic oceanography and oceanics; and private industry oceanics. The increasing number of conflicts between the use of the offshore area by these groups necessitate the formulation of offshore development guidelines. A use-priority system is suggested which would, unlike zoning, encourage the development of oceanic tchnology. Under this approach, certain enumerated uses would be designated as having 'priority'; all other uses would be permitted as long as they do not detrimentally affect the use or uses to which priority was assigned. Four usage areas and identified: (1) the area off La Jolla which has unique qualities as an undersea park for scientific observational purposes; (2) the nearshore area down to the 30 foot contour line which should be used mainly for recreational activities and aesthetic enjoyment; (3) the offshore area extending from the 30 foot to the 100 foot contours which should be used mainly for fishing and kelp harvesting; and (4) the sea beyond the kelp area (100' contour line to 3-mile limit) which should presently be open for diverse activities including private boating and yachting, and ocean oriented industrial research and testing. (Hoffman - North Carolina)
W74-02831

BOULDER CREEK FLOOD CONTROL PROJECT--AN ENVIRONMENTAL STATUS REPORT,
Corps of Engineers, Omaha, Neb.
G. E. Mick.
American Society of Civil Engineers, Annual Water Resources Engineering Conference, Washington, D.C., January 29-February 2, 1973. 13 p.

Descriptors: *Flood control, *Environmental effects, *Environmental engineering, *Design criteria, *Planning, Multi-purpose projects, Colorado, Ecosystems, Channelization, Social aspects, Aesthetics, Community development, Watershed management.
Identifiers: *Boulder (Colorado).

Environmental concerns now play an important role in flood control projects of the Corps of Engineers. For several reasons, partially lack of local support, a traditional flood control project on Boulder Creek in Boulder, Colorado was not constructed although it was authorized in 1950. Following a 1969 flood, interest in flood control for the creek was renewed, but concern for the environment was then a big factor in determining the type of flood control measures to be used. Boulder is unique in that the problem of flooding was recognized as early as 1910. A suggested method of control was to keep the flood prone area free from development. In 1969, some 70 to 80 percent of the land was under some type of quasi-public ownership. A citizen environmental group, composed of scientists, public officials and lay representatives of environmental groups, developed policy aspects for guidance of the Corps project. Some of the goals were: (1) protection from flooding of the 100-year flood, (2) preservation of the ecological characteristics of Boulder Creek, (3) maintenance of historic channel velocities where channel work is required, and (4) provision for easy availability of the flood-plain area for multi-purpose recreational use. As of early 1973 the project was still in the planning stage; however, the resulting integrated approach should prove to be best for all concerned. (Poertner)
W74-02859

LOWER WISCONSIN RIVER VALLEY SOIL RESOURCES AND USE POTENTIALS,
Wisconsin Univ., Wasusau. Univ. Extension.
For primary bibliographic entry see Field 04A.
W74-02957

CLEARWATER COASTAL ZONE MANAGEMENT PLAN.
RMBR Planning/Design Group, Tampa, Fla.
For primary bibliographic entry see Field 02L.
W74-03116

PRESERVATION OF RESERVOIR SITES,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
G. T. Olson, II.
Master's thesis. 1963. 145 p, 5 fig, 3 tab, 37 ref.

Descriptors: *Planning, *Water supply, *Reservoir sites, *Reservoirs, *Preservation, *Encroachment, Urban land use, Costs, Water demand, Legal aspects, Political aspects, Coordination, River basins, River basin development, Public rights, Potential water supply.
Identifiers: Floodplain management, River basin plans, Public action, Potential sites.

The interdependence of planning and preservation of reservoir sites to meet the nation's future water resource requirements, legal background for public action, alternative means and current efforts toward site preservation are examined. In many areas water resources development is being made more difficult by urban, industrial, agricultural and wildlife interests encroaching on potential reservoir sites. Where availability of sites is limited, their loss may affect the potential benefits of river basin development, producing an escalation in cost or a reduction in development potential of water resources. Methods of preservation of potential reservoir sites include: exercising governmental power already established to achieve reservoir preservation as a byproduct; using existing authorization to acquire land for water resources development; enacting new enabling legislation to provide for such authority. Possible means for the preservation of sites must satisfy the criteria for economic efficiency and

must include provisions for due process and just compensation. Alternatives for acquisition include fee simple titles, easements, coordination of government and private activities, tax policies, and police power, although financial constraints and the variety of situations involved limit their effectiveness. Discussion of these alternatives draws heavily on experience in land acquisition for other purposes. Steps toward preserving reservoir sites taken by some federal and state agencies are described. Roles of Federal, state and local governments and the private sector, along with elements of legislation for preservation are outlined. (Edwards - North Carolina)
W74-03123

FLOOD PLAIN INFORMATION FOR HARRIS FORK CREEK AND SOUTH FULTON BRANCH, FULTON, KENTUCKY AND SOUTH FULTON, TENNESSEE.
Army Engineer District, Memphis, Tenn.
For primary bibliographic entry see Field 04A.
W74-03125

THE ECONOMIC EFFECTS OF FLOODS. INVESTIGATIONS OF A STOCHASTIC MODEL OF RATIONAL INVESTMENT BEHAVIOR IN THE FACE OF FLOODS,
Brown Univ., Providence, R.I. Dept. of Economics.
For primary bibliographic entry see Field 06A.
W74-03193

6G. Ecologic Impact of Water Development

PERMIT APPLICATION BY RADCLIFF MATERIALS, INC.--DREDGING OF DEAD--REEF SHELLS, MOBILE BAY, ALABAMA (FINAL ENVIRONMENTAL STATEMENT). 21AVAILABLE NTIS, SPRINGFIELD, VA. 22151 AS EIS-AL-73-0542-F, PRICE $12.00 PRINTED COPY. FEBRUARY 1973. 187 P, 44 REF.
Army Engineer District, Mobile, Ala.

Descriptors: *Dredging, *Bays, *Alabama, *Permits, State governments, Environmental effects, Legal aspects, Environmental control, Ecology, Reviews.
Identifiers: *Dead-reef shell dredging, *Mobile Bay (Ala), Permit application, Public hearings, *Environmental Impact statements.

Radcliff Materials, Inc., of Mobile, Alabama, has applied to the Corps of Engineers for the combining and renewal of two existing Department of the Army permits authorizing the dredging of oyster shell from four areas within the confines of Mobile Bay, Alabama. Public involvement in this permit application has been active. Information meetings (four in all) have been held with special interest groups; a public hearing was held and the news media have given considerable time to coverage of the matter. This review considers the environmental impacts which would be involved in the issuance of a permit to perform shell dredging in Mobile Bay. The main topics include environmental setting; the environmental impact of the proposed action; adverse environmental effects which cannot be avoided should the permit be granted; alternatives to the proposed action; the relationship between local short-term uses of man's environment and maintenance and enhancement of long-term productivity; irreversible or irretrievable commitments of resources which are involved; and coordination with others. Letters of Coordination are presented. (Woodard-USGS)
W74-02737

STREAM CHANNELIZATION (PART 5).

Hearings--Subcomm. of the Comm. on Government Operations--U.S. House of Representatives, 93d Cong, 1st Sess, March 20, 1973. 500 p, 6 fig, 1 map, 5 photo, 1 tab, 7 append.

Descriptors: *Channels, *Wetlands, *Flood plains, *Water quality, *United States, Eutrophication, Sedimentation, Solid wastes, Pesticides, Wildlife, Watersheds, Governmental interrelations.
Identifiers: Congressional hearings.

On March 20, 1973 the Conservation and Natural Resources Subcommittee resumed hearings on the effects of federally sponsored channelization programs on rivers and streams. The committee was concerned that federal funds were being expended by government agencies with little attention to national policies aimed at preserving wetlands, discouraging flood plain development, and preserving and enhancing water quality. The Subcommittee also inquired into the following: the efforts of various federal agencies to provide opportunities for the public to fully participate in the consideration of channelization projects; the extent to which channelization increases eutrophication, sedimentation, and accumulations of solid wastes and pesticides; and the extent to which channelization destroys wetlands and wildlife habitats. Attention was focused on whether the Interior Department, the Environmental Protection Agency, and the Council on Environmental Quality were pressing their objections to channelization projects that were environmentally unsound and to the degree of success achieved in obtaining necessary changes or halting such projects. Appendixes include information on federal wetlands policy, watershed projects, the Secretary of Agriculture's termination of Water Bank Act program, and a copy of the Bureau of Sport Fisheries and Wildlife 'Policy and Guidelines for the Planning and Reveiw of Stream Channel Alteration Projects'. (See also W74-02778) (Sears-Florida)
W74-02777

STREAM CHANNELIZATION (PART 6).

Hearings--Subcomm. of Comm. on Government Operations--U.S. House of Representatives, 93d Cong, 1st Sess, March 22, 1973. 422 p, 3 map, 15 photo, 15 tab.

Descriptors: *Channel flow, *Environmental effects, *Channeling, Flood control, Water resources, Wildlife, Projects, Conservation, Natural resources, Legislation, United States.
Identifiers: Congressional hearing.

The report is part 6 of hearings on stream channelization before a subcommittee of the Committee on Government Operations of the House of Representatives. The committee heard from several expert witnesses, including counsel for the Resources Defense Unit of the National Wildlife Federation, the Director of Conservation of the National Wildlife Federation, and a representative of the National Audubon Society. The witnesses discussed advantages and disadvantages of stream channgelization on water resources, wildlife, environmental protection, fish and game, and flood control. At all times, it is the Corp of Engineers purpose to mitigate environmental damage in channeling projects. (See also W74-02777) (Daniels-Florida)
W74-02778

PRESERVATION OF WILDERNESS AREAS--HEARING ON S2453 AND RELATED WILDERNESS BILLS.
For primary bibliographic entry see Field 06E.
W74-02779

THE RISE AND FALL OF NATURAL RESOURCE SYSTEMS,
George Washington Univ., Washington, D.C.
For primary bibliographic entry see Field 06E.
W74-02786

CHINCOTEAGUE INLET, NAVIGATION PROJECT, ACCOMACK COUNTY, VIRGINIA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 08A.
W74-02800

POLLUTION ABATEMENT PROJECT, BANDELIER NATIONAL MONUMENT, NEW MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT).
National Park Service, Santa Fe, N. Mex.
For primary bibliographic entry see Field 05D.
W74-02801

A METHODOLOGY FOR ASSESSING ENVIRONMENTAL IMPACT OF WATER RESOURCES DEVELOPMENT.
Environmental Impact Center, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 06B.
W74-02822

NORTH CAROLINA WATER PLAN PROGRESS REPORT: CHAPTER 19: POWER AND WATER.
North Carolina State Dept. of Water and Air Resources, Raleigh.
For primary bibliographic entry see Field 03D.
W74-02836

BOULDER CREEK FLOOD CONTROL PROJECT--AN ENVIRONMENTAL STATUS REPORT,
Corps of Engineers, Omaha, Neb.
For primary bibliographic entry see Field 06F.
W74-02859

A STATEMENT PREPARED FOR SUBMISSION AT THE PUBLIC HEARING ON APPLICATION MADE BY BALTIMORE GAS AND ELECTRIC COMPANY FOR A PERMIT TO APPROPRIATE AND USE SURFACE WATER FOR OPERATION OF THE CALVERT CLIFFS NUCLEAR POWER PLANT MADE TO THE MARYLAND DEPARTMENT OF WATER RESOURCES,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 05C.
W74-02886

ENVIRONMENTAL CHALLENGES AND NUCLEAR FUELS,
Bechtel Power Corp., San Francisco, Calif.
For primary bibliographic entry see Field 05B.
W74-02892

NATIONAL ENVIRONMENTAL INFORMATION SYMPOSIUM: AN AGENDA FOR PROGRESS--PAPERS AND REPORTS, VOLUME 2.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-03040

ENVIRONMENTAL ASSESSMENT; POLLUTION ABATEMENT PROJECT, LAS VEGAS WASH AND BAY, ANNEX B.
VTN Nevada, Las Vegas; and Jones and Stokes Associates, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 05D.
W74-03118

INAL ENVIRONMENTAL IMPACT STATE-IENT FOR MODIFICATION OF A BOAT OCK AND RAMP.
enton City Planning Dept., Wash.

pril 24, 1973. 61 p, 3 fig.

escriptors: *Environmental effects, *Aquatic en-ronment, *Hydrofoils, Ecology, Water quality, ir pollution, Docks, Planning, *Washington, akes.
entifiers: *Lake Washington (Wash.), Noise, oeing Company, Renton (Washington), *En-ronmental impact statements.

he Boeing Company proposes to enlarge and odify a boat ramp and dock system in order to st ships for a commercial and military hydrofoil ogram. This impact statement for the proposal cuses on the exact nature of the proposal, the isting environmental conditions, the probable pact on these environmental conditions, alterna-es to the proposal, and the basic conflict tween local environmental preservation and ng-term economic productivity. Some of the en-ronmental features covered are topography, ology, flora, air quality, water quality, water-wl and fish, recreation potentials, and human es and values. The major impacts will affect the uatic environment, e.g. waterfowl, fish, and ater borne plant life, especially during the con-uction phase, and the air in the form of noise d emissions during the actual testing program. owever, this proposal would create less adverse vironmental effects than any alternatives for nducting the testing program. (Elfers - North rolina)
74-03124

RYSTAL DAM, RESERVOIR, AND POWER-LANT, CURECANTI UNIT, COLORADO VER STORAGE PROJECT, COLORADO UPPLEMENT TO THE FINAL ENVIRON-ENTAL STATEMENT).
ureau of Reclamation, Salt Lake City, Utah.
r primary bibliographic entry see Field 08A.
74-03130

INVENTORY OF ENVIRONMENTAL ESOURCES RESEARCH IN PROGRESS, OLORADO STATE UNIVERSITY.
olorado State Univ., Fort Collins. Environmental sources Center.

formation Series No. 3, July 1972. 53 p.

escriptors: *Environmental control, Ground-ter, Water supply, *Water quality, Water con-l, Waste disposal, Management, Planning, ater conservation, Comprehensive planning, ocumentation, Information retrieval, *Universi-s, Education, *Research and development.

e environmental resources research in progress Colorado State University is described. This ecial report has been assembled from annual ogress reports submitted by the various colleges. has been compiled to summarize work in ogress on subjects closely related to environ-ntal quality. The focus was placed upon en-onmental concerns and closely related natural ources problems. Contents include the areas of vironmental contaminants, environmental alth, environmental impact, fisheries and wil-fe, groundwater, waste disposal, water cycle, ter quality management and control, water ources planning, and water supply augmenta-n and conservation. (Daniels-Florida)
74-03133

OBLEMS AND INSTRUMENTS RELATING THE ALLOCATION OF ENVIRONMENTAL OSTS.
ganization for Economic Co-Operation and velopment, Paris (France). Water Management ction Group.

For primary bibliographic entry see Field 06B.
W74-03198

07. RESOURCES DATA

7A. Network Design

SNOW SURVEY MEASUREMENTS THROUGH 1970,
California State Dept. of Water Resources, Sacramento. Snow Surveys and Water Supply Forecasting Section.
For primary bibliographic entry see Field 02C.
W74-02738

7B. Data Acquisition

AN ANALYTICAL METHOD FOR TOTAL HEAVY METAL COMPLEXING AGENTS IN WATER AND ITS APPLICATION TO WATER QUALITY STUDIES,
Missouri Water Resources Research Center, Columbia.
For primary bibliographic entry see Field 05A.
W74-02658

THE MEASUREMENT OF THE HEAT OF REACTION BETWEEN PROTEINS AND CLAY MINERALS BY MICROCALORIMETRY,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
For primary bibliographic entry see Field 02G.
W74-02669

A MULTI-PURPOSE DATA ACQUISITION SYSTEM FOR INSTRUMENTATION OF THE NEARSHORE ENVIRONMENT,
Scripps Institution of Oceanography, La Jolla, Calif.
W. A. Koontz, and D. L. Inman.
Available from NTIS as AD-659 334, $1.45 in microfiche. Army Coastal Engineering Research Center Technical Memorandum No 21, August, 1967. 45 p, 18 fig, 11 ref, 1 append.

Descriptors: *Ocean waves, Tides, *Coasts, Energy, Sediments, Currents (Water), *Photography, *Instrumentation, *Data processing, *Computer programs.
Identifiers: Nearshore processes.

Most energy from ocean waves and tides is ultimately transmitted to the coastal periphery or nearshore zone. The dissipation of this energy creates a complex environment characterized by intense interactions between waves, currents, and sediments. A data acquisition system, using digital techniques, has been designed and used in the laboratory and field; it provides instantaneous-synoptic measurements of the nearshore environment. Using modern computer techniques, the special sensors of the system include: a digital wave gage with self-contained logic circuitry; a vibrating-wire transducer to measure pressures on the bottom; a Savonius current meter; and a photography technique for estimating the density of suspended sediments. (Sinha-OEIS)
W74-02688

ENERGY MEASUREMENTS IN THE SWASH--SURF ZONE,
University of Southern California, Los Angeles. Dept. of Geology.
For primary bibliographic entry see Field 02E.
W74-02702

TIDAL CURRENT SURVEYS BY PHOTOGRAMMETRIC METHODS,
Coast and Geodetic Survey, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-02707

GEOCHRONOLOGICAL STUDIES IN SANTA BARBARA BASIN: FE-55 AS A UNIQUE TRACER FOR PARTICULATE SETTLING,
Tata Inst. of Fundamental Research, Bombay (India).
For primary bibliographic entry see Field 02J.
W74-02722

DETERMINATION OF THE ASSOCIATION AND DISSOCIATION OF HUMIC ACID FRACTIONS BY SMALL ANGLE X-RAY SCATTERING,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 02K.
W74-02730

FLUORESCENT SPECTROSCOPY, A TECHNIQUE FOR CHARACTERIZING SURFACE FILMS,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 05A.
W74-02731

COMPARISON OF METHODS OF DERIVING UNIT HYDROGRAPHS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W74-02828

A PORTABLE APPARATUS FOR MEASURING RELATIVE GAS VACUOLATION, THE STRENGTH OF GAS VACUOLES, AND TURGOR PRESSURE IN PLANKTONIC BLUE--GREEN ALGAE AND BACTERIA,
California Univ., Berkeley. Dept. of Botany.
For primary bibliographic entry see Field 05A.
W74-02976

ENERGY SIGNATURE MEASURES SYSTEM CHANGES,
S. J. Bailey.
Control Engineering, Vol 20, No 10, p 45-46, October 1973. 3 fig, 1 tab.

Descriptors: *Control systems, Data processing, Automatic control, Monitoring.
Identifiers: *Process control.

New equipment has been developed which follows system changes by monitoring changes in input power. The instrument captures transient data and displays it for field comparison, detects trends in process deviation from norm, and preprocesses frequency spectra for later detailed computer analysis. Its basic function is to aid in determination of frequency components whose telltale variation from proper to improper operation make them valuable in the performance of automatic 'machine minding.' Machining, forming, mixing, welding, and powder compression processes have been monitored by this procedure. Other potential applications exist where pumps, valves, or other mechanically driven devices are involved. (Little-Battelle)
W74-02981

A FLOW PATH GROUND WATER SAMPLER,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
L. S. Willardson, B. D. Meek, and M. J. Huber.
Soil Sci Soc Am Proc. Vol 36, No 6, p 965-966. 1972. Illus.
Identifiers: Drainage, Flow paths, *Groundwater flow, Sampling, *Tile drainage, *Water sampler.

A sampling system is described that enables collections of water samples from different flow paths in the groundwater system around a tile drain. The sampler can be installed as a regular part of a tile drainage system.--Copyright 1973, Biological Abstracts, Inc.
W74-03126

PLANNING AND ANALYSIS OF PULSE-TESTS,
Continental Oil Co., Ponca City, Okla.
For primary bibliographic entry see Field 02F.
W74-03164

7C. Evaluation, Processing and Publication

A STATISTICAL APPROACH TO DYNAMIC MODELING AND CONTROL OF WATER DISTRIBUTION SYSTEMS,
Polytechnic Inst. of Brooklyn, N.Y.
For primary bibliographic entry see Field 04A.
W74-02673

COMPUTER SIMULATION FOR UPGRADING EXISTING WASTEWATER TREATMENT FACILITIES BY CHEMICAL PHYSICAL TREATMENT,
Envirotech Corp., Brisbane, Calif.
For primary bibliographic entry see Field 05D.
W74-02681

NEW SIMULATION APPROACHES TO THE MODELING OF ENVIRONMENTAL SYSTEMS,
California Univ., Los Angeles. Dept. of Computer Science.
For primary bibliographic entry see Field 06A.
W74-02684

A MULTI-PURPOSE DATA ACQUISITION SYSTEM FOR INSTRUMENTATION OF THE NEARSHORE ENVIRONMENT,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 07B.
W74-02688

STUDY OF TIME VARIABILITY OF SURFACE CURRENTS AT A POINT IN MONTEREY BAY,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 02L.
W74-02692

COASTAL IMAGERY DATA BANK: INTERIM REPORT,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-02701

WATER RESOURCES DATA FOR COLORADO, 1972: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Lakewood, Colo.

Basic-data report, 1973. 391 p, 2 fig, 3 ref.

Descriptors: *Hydrologic data, *Surface waters, *Colorado, Water resources, *Water yield, Streamflow, Flow rates, Gaging stations, Reservoirs, Lakes, Crest-stage gages, Stream gages, Peak discharge, Low flow, Average flow, Reservoir storage, Basic data collection.

Surface-water records for the 1972 water year for Colorado, including records of streamflow or reservoir storage at gaging stations, partial-record stations, and miscellaneous sites, are tabulated. The locations of the gaging stations and crest-stage and storm-runoff partial-record stations are shown. Records for a few pertinent gaging stations in bordering States are also included. The records were collected and computed by the Water Resources Division of the U. S. Geological Survey. The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. The description of the gaging station gives the location, drainage area, period of record, type and history of gages, average discharge, extremes of discharge or contents, and general remarks. (Woodard-USGS)
W74-02724

CONSTRUCTION OF A MAP OF AVERAGE ANNUAL RUNOFF FOR NORTH KAZAKHSTAN (POSTROYENIYE KARTY NORMY STOKA SEVERNOGO KAZAKHSTANA),
Moscow State Univ. (USSR). Dept. of Hydrobiology.
For primary bibliographic entry see Field 02E.
W74-02751

ANALYSIS, MODELING AND FORECASTING OF STOCHASTIC WATER QUALITY SYSTEMS, VOLUME I, TIME SERIES ANALYSIS IN WATER QUALITY MODELING,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 05B.
W74-02823

ANALYSIS, MODELING AND FORECASTING OF STOCHASTIC WATER QUALITY SYSTEMS, VOLUME II, NONLINEAR FILTRATION AND ESTIMATION IN WATER QUALITY MODELING,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 05B.
W74-02824

TEMPERATURE OF MISSOURI STREAMS,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 02K.
W74-02885

ON-LINE SIGNAL DIGITIZING FOR COMPUTER INPUT,
P. A. Zarcades.
Control Engineering, Vol 20, No 10, p 48-51, October 1973. 4 fig.

Descriptors: *Data processing, Data transmission, Computers, Electronic equipment.
Identifiers: *Signal conditioning, *Analog-to-digital conversion, Accuracy.

Advantages, disadvantages, and problems of various techniques for conditioning, measuring, converting, and transferring analog data for input to digital computers are presented. (Little-Battelle)
W74-02950

X-Y RECORDERS.

Measurements and Data, Vol 7, No 5, p 99-103, September/October 1973. 7 fig, 1 tab.

Descriptors: *Costs, Laboratory equipment, *Electronic equipment.
Identifiers: *Recorders (X-Y).

Accuracy, speed, dimensions, costs, manufacturers, and other pertiant information are listed for commercially avilable X-Y recorders operating with analog signals. (Little-Battelle)
W74-02969

COMPUTERIZED DIGITAL DATA ACQUISITION SYSTEM FOR THERMOGRAVIMETRY AND SIMILAR APPLICATIONS,
General Electric Corporate Research and Development, Schenectady, N.Y.
For primary bibliographic entry see Field 02K.
W74-02977

COMPUTER ANALYSIS OF DATA FROM POTENTIOMETRIC TITRATIONS USING ION--SELECTIVE INDICATOR ELECTRODES,
Hawaii Univ., Honolulu. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W74-02978

LOW-COST DIGITAL DATA ACQUISITION SYSTEMS,
E. J. Kompass.
Control Engineering, Vol 20 No 11, p 58-61 November 1973. 12 fig.

Descriptors: *Data processing, Electronic equipment, Data transmission.
Identifiers: *Data acquisition systems.

The capabilities of low-cost digital data acquisition systems from 40 manufacturers are reviewed. The equipment is categorized according to available features. (Little-Battelle)
W74-02980

DIGITAL MAGNETIC RECORDING OF WIDE BAND ANALOG SIGNALS,
Ampex Corp., Redwood City, Calif. Instrumentation Div.
C. F. Spitzer.
Computer Design, Vol 12, No 10, p 83-90, Octobe 1973. 8 fig, 1 tab, 9 ref.

Descriptors: *Data processing, *Electronic equipment, Data transmission, Data storage and retrieval.
Identifiers: *Signal conditioning, Recorders Signal-noise ratios, Analog-to-digital conversion Analog signals, Errors.

Digitization of a signal offers significant advantages when that signal exceeds the analot band width of the recorder or when unacceptable signa degradations occur due to noise contamination crosstalk or spurious signals, limited dynami range, and perturbations of the recorders' timebase. If the signal is sampled and digitized, a error is necessarily incurred since that signal wi probably not have been at an exact quantizin level. The rms value of the resultant digitizing er ror, or quantization noise, results in a peak-to peak signal to rms error ratio of S/N ratio equal (10.8 plus 6m) dB, where m is the number of bit per sample. This expression is valid for unstruc tured signals. In the case of structured signals (e TV), undesirable effects can be removed by artif cially introducing white noise of a magnitude o two or three quantization steps. There are nu merous methods for varying degrees of compres sion and signal deterioration. A factor of six seem feasible for image transmission. Proper selectio of a recording code can also aid in minimizin bandwidth requirements. Care must be taken i ADC and DAC selection to prevent converte problems from degrading the system significantly For many future recording applications, the ad vantages of pulse code modulation recording o analog signals are expected to outweigh the draw backs of higher equipment complexity. (Little-Ba telle)
W74-02982

GUIDE TO SELECTING DIGITAL MUL TIPLEXERS,
A. Krigman.
Instruments and Control Systems, Vol 46, No 1 p 63-68, November 1973. 7 fig, 1 tab.

Descriptors: *Data transmission, Data processin Electronic equipment.
Identifiers: *Multiplexers.

Time division and frequency division multiplexin parameters for consideration in selecting mu

tiplexing systems are discussed. A reference guide to multiplexers, their capabilities, and manufacturers are included. (Little-Battelle)
W74-02983

SURFACE WATER SUPPLY OF THE UNITED STATES, 1966-70--PART 6. MISSOURI RIVER BASIN: VOLUME 2. MISSOURI RIVER BASIN FROM WILLISTON, NORTH DAKOTA, TO SIOUX CITY, IOWA.
Geological Survey, Washington, D.C.

Available from GPO, Washington, D.C. 20402- Price $3.20 domestic postpaid; $2.75 GPO Bookstore. Water-Supply Paper 2117, 1973. 612 p, 1 fig.

Descriptors: *Streamflow, *Flow measurement, *Gaging stations, *Missouri River Basin, *Missouri River, North Dakota, South Dakota, Minnesota, Montana, Wyoming, Nebraska, Iowa, Hydrologic data, Basic data collections, Stream gages, Flow rates, Lakes, Reservoirs, Water levels, Crest-stage gages, Average flow, Low flow, Peak discharge.

This volume of surface water data for the Missouri River Basin from Williston, N. Dak., to Sioux City, Iowa, is one of a series of 37 reports presenting records of stage, discharge, and content of streams, lakes, and reservoirs in the United States during the 1966-70 water years. The tables of data include a description of the gaging station, and daily, monthly, and yearly discharges of the stream. The description of the station gives the location, drainage area, records available, type and history of gage, average discharge, extremes of discharge, and general remarks. For most gaging stations on lakes and reservoirs a description of the station and a monthly summary table of stage and contents are given. Data for partial-record stations include measurements at low-flow partial-record stations and annual maximum stage and discharge at crest-stage stations. (Woodard-USGS)
W74-03035

FEDERAL ENVIRONMENTAL DATA CENTERS AND SYSTEMS,
National Oceanographic Data Center, Washington, D.C.
For primary bibliographic entry see Field 10D.
W74-03043

COMPUTER SIMULATION OF SHALLOW-WATER MARINE SEDIMENTATION,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-03109

UNCERTAINTY IN THE RETURN PERIOD OF MAXIMUM EVENTS: A BAYESIAN APPROACH,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 02B.
W74-03137

08. ENGINEERING WORKS

8A. Structures

FLOOD CONTROL PROJECT PLANNING BY MATHEMATICAL PROGRAMMING: A PROJECT-EXPANSION APPROACH,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 04A.
W74-02674

CRATER-SINK SAND TRANSFER SYSTEM,
Scripps Institution of Oceanography, La Jolla, Calif.
D. L. Inman, and R. W. Harris.
In: Proceedings of the Twelfth Coastal Engineering Conference, Washington, D.C. September 1970, p 919-933 (1970). 7 fig, 1 tab, 20 ref.

Descriptors: *Coastal structures, *Engineering structures, *Sediment transport, Shore protection.
Identifiers: Nearshore processes.

A sand transfer system that requires no surface impounding area and that can be installed and operated at low cost is proposed. The system consists of a hydraulic jet assembly operating from the bottom of a sand crater. A jet pump and suction mouth are located at the lowest point of a crater-like depression dredged into the sea floor. The crater acts as a gravity-fed sink for sand and other cohesionless material, thus serving the dual purpose of a mechanism for collecting sand and a sub-surface impounding area for the accumulation of sand. The advantages of the crater-sink sand transfer system over conventional dredging appear to include: (1) simple, inexpensive equipment requiring a minimal amount of labor; (b) lower operating costs; (c) no obstruction to navigation; (d) elimination of the up-coast sand impounding area; and, (e) the ability to operate throughout the year, thus providing a continuous bypass operation which maintains the natural drift rates along the coast and eliminates the down-coast zone of erosion. Once perfected, it would appear that a crater-sink sand transfer system would have a variety of coastal and inland applications. In addition to its use at sandy inlets, it would appear to have potential for pumping sediment from dams that have intercepted the supply of sand formerly brought to the coast by streams and rivers. Also, the sand transfer system could be used to recycle sand to feeder beaches on a coast with littoral drift. Sand trapped on the down-coast end of a beach could be pumped to feeder beaches along the up-coast portions of the beach where it again becomes available for longshore transport. (Sinha-OEIS)
W74-02705

CHINCOTEAGUE INLET, NAVIGATION PROJECT, ACCOMACK COUNTY, VIRGINIA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Norfolk, Va.

Available from National Technical Information Service as EIS-VA-73-0475-F, $3.50 in paper copy. April 5, 1972. 24 p, 1 map.

Descriptors: *Virginia, *Channels, *Inlets, *Construction, Navigable waters, Biota, Dredging, Turbidity, Disposal, Environmental effects, Channel improvement, Channel construction.
Identifiers: *Environmental Impact Statements, *Accomack County (Va).

The project is for the construction of a channel across the ocean bar at Chincoteague Inlet, Accomack County, Virginia. Additional construction would involve a channel from the entrance channel to the presently authorized Chincoteague Channel on the Waterway on the Coast of Virginia. Increased channel dimensions on the outer bar will decrease the chances of vessel damage by collision and grounding; increased dimensions on the inner reaches will provide safe navigable access to the Waterway on the Coast of Virginia, and thence to Chincoteague. Adverse environmental effects include loss of bottom material and its associated biota from the dredging and temporary turbidity during channel construction. Three acres of low upland terrain will be used as a disposal site. Included are comments on the project from nine entities. (Sears-Florida)
W74-02800

ENGINEERING WORK LEADING TO A ROCK TUNNEL PLAN,
Greater Chicago Metropolitan Sanitary District, Ill.
F. C. Neil, and C. J. Keifer.
Paper presented at the Rapid Excavation and Tunneling Conference, American Society of Civil Engineers, New York, June 5-7, 1972. 12 p, 6 fig.

Descriptors: *Combined sewers, *Storm runoff, *Underground storage, *Water pollution control, *Sewers, *Underflow, Water quality control, Illinois, Water pollution sources, Sewage districts, Urbanization, Sewerage, Tunnels, Storage, Overflow.
Identifiers: *Chicago (Ill), *Deep tunnel storage, *Combined sewer overflow.

The threat of pollution of Chicago's source of water supply, Lake Michigan, will continue as long as combined sewer overflows exist. With stormwater pollution problems becoming constantly greater as more land is paved, mixtures of raw sewage and storm water may of necessity be discharged into the Lake. In Chicago, there are an estimated 640 sewer overflows serving 375 square miles of central Chicago and 49 suburbs. The search for a method to alleviate this problem has been underway actively since 1966 a special engineering report on the combined sewer overflow problem was prepared. This report recommended the development of an extensive system of tunnels and reservoirs to be located about 800 feet below ground surfaces. Studies by other agencies involved with pollution control and flooding suggested different methods of control, although there was agreement that a new approach to the problem was needed. In 1970, it was decided to consolidate the various proposals and formulate a comprehensive solution. With a complete consideration of all factors, including sewage treatment, geology, water supply, navagation, recreation, power and costs, alternatives were organized into various possible alternatives. Seventeen alternative plans were selected for detailed evaluation. The plan selected for the construction of a deep tunnel system which would have a storage of 2.7 inches of rainfall, reducing spillage BOD by 99.7 percent and spillage of settable solids by 99.9 percent. In a 21-year storm record, which included the most severe storms of record, only 4 storms would have overloaded the proposed system. Construction costs are estimated at $1.2 billion to $2.6 billion. (Poertner)
W74-02853

THE JACKING METHOD IN TUNNEL CONSTRUCTION,
Greater Chicago Metropolitan Sanitary District, Ill.
S. J. Sulinski.
Paper presented at the Rapid Excavation and Tunneling Conference, American Society of Civil Engineers, New York, June 5-7, 1972. 13 p, 4 fig, 1 tab.

Descriptors: *Underground structures, *Tunneling, *Tunnel construction, *Construction, *Tunneling machines, Construction equipment, Project planning, Construction costs, Sewers, Illinois.
Identifiers: *Jacking, *Underground construction.

The contract documents of the Metropolitan Sanitary District of Greater Chicago for new tunnel construction permit the contractor four separate alternate tunnel sections. This is a part of the District policy to encourage the use of the most suitable and proven construction techniques. One such technique is the jacking method. This paper reviews the jacked tunnel construction method and deals with the experience gained from the construction of 10,500 feet of 5'-6" inside diameter jacked tunnel. The tunnel was located within soil ranging from loose to dense gray silt (1500 feet) and 'dense and extreme dense' gray, course (sic) to fine, sand (3,100 feet) to very stiff, to hard, gray clayey silt (5,900 feet). The cover over the tunnel ranged from 30 to 50 feet in thickness. The groundwater level was within several feet of the surface. Jacking shafts coincided with manhole locations and were from 353 feet to 734 feet apart, with an average spacing of 600 feet. The contractor's con-

struction procedure is shown in a figure and consists partially of the following: (1) a fully-shielded mining machine, with a reversible cutting wheel is propelled against the earth, sending the excavated material by conveyor into muck cans; (2) the mining is jacked against a steel jacking can fabricated to fit the leading pipe to protect the pipe from points of high compression; (3) the pipe is pushed through the excavation by four 150 ton jacks operating through a metal ring and the excavation is guided by laser beam; (4) the outside surface of the pipe is lubricated by bentonite that is injected, both by the mining machine and through shafts from the ground surface to the pipe. (Poertner)
W74-02855

WATER WELL STANDARDS--ARROYO GRANDE BASIN, SAN LUIS OBISPO COUNTY,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 05B.
W74-03057

CRYSTAL DAM, RESERVOIR, AND POWERPLANT, CURECANTI UNIT, COLORADO RIVER STORAGE PROJECT, COLORADO (SUPPLEMENT TO THE FINAL ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Salt Lake City, Utah.

Available from the National Technical Information Service as EIS-CO-73-0746-F-S $3.25 in paper copy, $1.45 in microfiche. April 30, 1973. 20 p, 1 photo.

Descriptors: *Colorado, *Damsites, *Dams, *Arch dams, *Concrete structures, *Dam design, *Hydro-electric powerplants, *Rivers, *Reservoir construction, Reservoir sites, Reservoirs, Water levels, Powerhead, Tailrace, Canyons, Transmission lines, Waste water treatment.
Identifiers: *Environmental Impact Statements, Montrose (Colo).

This supplement to the final environmental statement on the Crystal dam project in Colorado includes: description of the project, description of the environment, environmental impacts of proposed action, mitigating measures and air and water quality aspects, unavoidable adverse effects, short and long-term environmental uses, irreversible and irretrievable commitments of resources, alternatives to the proposed action, and consultation and coordination during development of the supplement. The final environmental statement for the Crystal Dam, Reservoir, and Powerplant evaluated the environmental impact from proposed construction of a double-curvature, thin-arch concrete dam and 28,000 KW hydroelectric powerplant on the Gunnison River about 15 miles east of Montrose, Colorado. This supplement encompasses changes from the preliminary design concepts and additional investigations and studies to lessen the environmental impact of the proposed construction. Changes include the possibility of raising the reservoir's normal water surface five feet above the original proposal, raising the grade of the downstream channelization, increasing the power head, and moving the location of the powerplant to provide more desirable flow conditions in the tailrace and downstream channel and to eliminate much of the disturbance to the canyon wall. (Sears-Florida)
W74-03130

PETROGRAPHY AND ENGINEERING PROPERTIES OF IGNEOUS ROCKS,
Bureau of Reclamation, Denver, Colo.
R. C. Mielenz.
Engineering Monographs No. 1, 1948, Revised 1961. 18 p, 16 fig, 1 tab.

Descriptors: Groundwater, *Foundation rocks, Foundations, *Petrology, *Physical properties, Rock foundations, *Rock properties, *Strength, *Elasticity, *Permeability, *Density, *Solubility.
Identifiers: *Igneous rocks, *Petrography, Stewart Mountain Dam, Keyhole Dam, Chiflo Damsite.

Most modern hydraulic structures rest upon rock foundations, some rest laterally against rock abutments, and essentially all are composed, at least in part, of rock material. The design of engineering works and methods of construction depend to a great extent on the strength, elasticity, permeability, durability, density, volume change, and solubility of rocks. The petrographic classification of rocks is based upon composition, texture, and structure -- the same characteristics upon which rock properties depend. This monograph was prepared to explain the basis and method of petrographic classification, bringing to the engineer a summary view of the range of rock composition, texture, and structure, and the relationship of these to rock properties. Samples of rock as well as earth materials are analyzed and tested petrographically in connection with planning, design, construction, and maintenance problems. (Campbell-NWWA)
W74-03143

DEEP WELL SUBMERSIBLES ARE GROWING,
KSB Pump Co., East Rutherford, N.J.
For primary bibliographic entry see Field 08C.
W74-03147

ENGINEERING ECONOMICS OF RURAL WATER SYSTEMS: A NEW AMERICAN APPROACH,
National Water Well Association, Houston, Tex., Research Facility.
For primary bibliographic entry see Field 06B.
W74-03152

8B. Hydraulics

FEASIBILITY STUDY: HYDRAULIC FRACTURING OF DRILLED WATER WELLS TO STIMULATE THEIR YIELD,
Water Resource Research Center.
G. W. Stewart.
Available from the National Technical Information Service as PB-226 439 $2.45 in paper copy, $1.45 in microfiche. Project Completion Report (1973) 14 p. OWRR A-024-NH (1). 14-31-0001-3229.

Descriptors: *Water wells, Drilling, Simulation analysis, Crystalline rock, New England.
Identifiers: *Hydraulic fracturing, Drilled water wells, *Well yields, *Rock wells, *Well simulation.

Many towns in the New England states are without a municipal water system. The water used in thousands of homes is being supplied by springs, dug wells or, most commonly today, by rock wells-holes drilled either in igneous or metamorphic (crystalline) rocks. Not all such wells yield an adequate supply of water. This study was undertaken to determine whether or not it would be feasible to launch a project which would utilize the method of hydraulic fracturing to stimulate the yield of wells drilled in crystalline rocks. The assumptions disclosed by this study indicated that such a project would be of considerable benefit.
W74-02659

AN INVESTIGATION OF THE DEFORMATION AND BREAKING OF SOLITARY WAVES,
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02E.
W74-02694

WAVE INDUCED OSCILLATIONS IN HARBORS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
For primary bibliographic entry see Field 02L.
W74-02708

SAND BUDGET FOR CAPITOLA BEACH, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
R. G. Anderson.
MSC thesis, March 1971. 59 p, 7 fig, 6 tab, 11 ref, 4 append. Available from NTIS as AD-728 724, $3.00 in paper copy.

Descriptors: *California, *Beach erosion, *Coastal structures, Harbors, *Barriers, Seasonal, Groins (Structures).
Identifiers: Capitola beach (Calif), Sand budget.

The beach at Capitola, California has a history of short-term variations about a nominally wide beach. This pattern was interrupted in 1965 when the beach was greatly depleted following the construction of Santa Cruz Harbor. The beach remained small until the construction of a groin and subsequent sand fill at Capitola in 1970. The annual sand budget developed for Capitola in 1970. The annual sand budget developed for Capitola Beach shows a net gain of 1,300 cu. yds. The sand sources are littoral drift, 300,000 cu. yds., river discharge, 8,000 cu. yds., and seacliff erosion 3,800 cu. yds., while sand loss is due to littoral drift, 310,500 cu yds. The observed short-term variations in the beach are reflected in the monthly sand budget. The budget permits evaluation of the effect on the beach of varying each source due to the construction of artificial barriers. It is concluded that the harbor construction at Santa Cruz was responsible for the sand depletion at Capitola Beach in 1965. (Sinha - OEIS)
W74-02718

ON GENERALIZED HYDRODYNAMIC EQUATIONS USED IN HEAT TRANSFER THEORY,
Akademiya Navuk BSSR, Minsk. Inst. of Heat and Mass Transfer.
V. A. Bubnov.
International Journal of Heat and Mass Transfer, Vol 16, No 1, p 109-119, 1973, 4 fig, 1 tab, 4 ref.

Descriptors: *Heat transfer, Mathematics, *Mathematical models, *Fluid mechanics, Hydraulic engineering, Equations, Model studies, Analytical techniques, Surfaces, Viscosity, *Hydrodynamics, Flow, Reynolds number.
Identifiers: Navier-Stokes equations, Discontinuous flow, Euler equation.

A new method to compose generalized solutions of hydrodynamics equations is presented. In the derivation of a viscous fluid equation, discontinuous change of the velocity which occurs in shock waves, eddy flows, and sonic and sub-sonic flow is taken into account. The discontinuity is not included into hydrodynamic equations in the Navier-Stokes form. The solution of a problem of vortex fibre and surface interaction is used as illustration of this method. In this particular case the Euler equations result in the known paradox of Fel Klein and the Navier-Stokes equations give paradox solutions originally examined by M. Goldshtik. The present method eliminates the paradoxes. (Jerome-Vanderbilt)
W74-02880

TURBULENT HEAT TRANSFER AND TH PERIODIC VISCOUS SUBLAYER,
Bell Labs., Murray Hill, N.J.
R. L. Meek, and A. D. Baer.
International Journal of Heat and Mass Transfe Vol 16, No 7, p 1385-1396, 1973. 7 fig, 34 ref. G 1357 GK-10114.

Descriptors: *Heat transfer, *Turbulence, *Laminar flow, *Viscosity, Fluid mechanics, Hydraulics, Mass transfer, Flow, Metals, Surfaces, Reynolds number, Mathematical studies, Models, Equations, Temperature, Distribution patterns.

Heat transfer calculations based on the fluctuating viscous sublayer model of turbulent flow are presented which incorporate two essential but heretofore neglected features of the real situation; namely, that the sublayer fluctuations impose wall temperature fluctuations and that on average the sublayer does not decay completely to the wall but rather there exists a maximum turbulence penetration thickness. The resulting temperature distributions and heat transfer coefficients are in agreement with empirical correlations of the experimental data for Prandtl numbers greater than one. Heat transfer to liquid metals is also considered (Prandtl number much less than one) and computed heat transfer coefficients are 25-50 per cent higher than published correlations of empirical data. The computations indicate that for liquid metals the Nusselt number is not a single-valued function of the Peclet number. (Jerome-Vanderbilt)
W74-02884

FREE CONVECTION FILM CONDENSATION OF STEAM IN THE PRESENCE OF NON-CONDENSING GASES,
Queen Mary Coll., London (England). Dept. of Mechanical Engineering.
H. K. Al-Diwany, and J. W. Rose.
International Journal of Heat and Mass Transfer, Vol 16, No 7, p 1359-1369, 1973. 9 fig, 14 ref.

Descriptors: *Theoretical analysis, *Steam, *Heat transfer, *Condensation, *Film condensation, Fluid mechanics, Hydraulics, Temperature, Convection, Gases, Transfer, Mathematical studies, Equations, Evaporation, Laminar flow, Flow, Non-condensing gases, Nusset theory.

The effect of non-condensing gases in reducing the heat flux during condensation of vapors is well known and has contributed toward a theoretical understanding of film condensation on plane surfaces under laminar flow conditions. Limited experimental data show that the theory predicted substantially smaller heat transfer coefficients than are found empirically. Heat-transfer measurements for film condensation of steam on a vertical plane surface in the presence of air argon, neon and helium, under free-convection conditions are reported. The results indicate greater reductions in heat transfer for given non-condensing gas concentrations, than suggested by earlier reports. The present measurements agree satisfactorily with recent boundary-layer analysis. (Jerome-Vanderbilt)
W74-02896

THEORETICAL ANALYSIS OF FORCED LAMINAR CONVECTION HEAT TRANSFER IN THE ENTRANCE REGION OF AN ELLIPTIC DUCT,
Liverpool Polytechnic (England). Dept. of Mechanical, Marine and Production Engineering.
J. E. Gilbert, R. W. Leay, and H. Barrow.
International Journal of Heat and Mass Transfer, Vol 16, p 1501-1503, 1973. 3 fig, 4 ref.

Descriptors: *Fluid mechanics, Hydraulics, *Heat transfer, *Laminar convection, *Convection, Flow, Temperature, *Theoretical analysis, Mathematical Models, Model Studies, Equations, Laminar Flow.

The forced laminar convection to a fluid of vanishing viscosity in the thermal entrance region of an elliptic duct is examined theoretically. The elliptic geometry affords a convenient means of studying the effect of heat transfer of systematic departure from the circular shape. Using orthogonal curvilinear co-ordinates, the constant property energy equation is presented without heat generation and assuming negligible axial conduction. The equation is simplified and solved for the dimensionless temperature. The axial and peripheral variation of local heat transfer in a plug flow in an elliptic duct of various flow conditions and geometrics is determined. Values of Nusselt numbers are presented. The curves indicate the marked reduction in heat transfer as the ellipse became narrower. (Jerome-Vanderbilt)
W74-02897

CALCULATION OF HEAT TRANSFER IN TURBULENT FLOW WITH ALLOWANCE FOR SECONDARY FLOW,
Gosudarstvennyi Komitet po Ispolzovaniyu Atomnoi Energii SSSR, Obninsk. Fiziko-Energeticheskii Institut.
M. H. Ibragimov, V. S. Petrishchev, and G. I. Sabelev.
International Journal of Heat and Mass Transfer, Vol 14, No 8, p 1033-1037, 1971. 6 fig, 8 ref.

Descriptors: *Flow, *Heat, *Mathematical models, *Turbulent flow, Fluid mechanics, Hydraulics, Mass transfer, Thermal properties, Equipment, Structural engineering, Temperature, Model studies, Velocity, Reynolds number.
Identifiers: Thermal diffusivity, Secondary flow.

The problem of transfer of scalar property in turbulent flow is one of the more complex problems in the theory of turbulence. A calculation method is proposed for the determination of the temperature field in a fluid in noncircular ducts. A solution with inclusion of secondary flow means that the corresponding thermophysical calculations may be performed with a higher degree of accuracy and reliability. The calculation results are given for the case of turbulent flow in a square duct. For comparison, results of measurements are presented of a temperature field in fluid flow under conditions close to those assumed in the calculations. (Jerome-Vanderbilt)
W74-02904

FEASIBILITY OF MODELING RUN-UP EFFECTS OF DISPERSIVE WATER WAVES,
Naval Civil Engineering Lab., Port Hueneme, Calif.
J. M. Jordaan, Jr.
Available from NTIS as AD-619 053, $6.00 paper copy, $1.45 microfiche. Technical Note N-691, May 1965. 46 p, 23 fig, 5 tab, 15 ref.

Descriptors: *Beaches, *Waves (Water), *Explosions, Nuclear explosions, *Coastal structures, Feasibility studies.
Identifiers: *Scale models, Underwater explosions, *Wave run-up, Dispersive waves, Shoaling, Oscillatory waves.

Studies were made in a laboratory test basin to determine the feasibility of modeling run-up effects of explosively generated water waves on beach and waterfront structures. Results were compared with (1) analytically derived predictions, and (2) wave measurements (but not run-up) made in the ocean with high-energy (HE) explosives as the generating source. The test basin is 92 feet by 94 feet in size with 1:5, 1:13.6 and 1:5 sand beaches on three sides and on the fourth a 14-foot-diameter semi-paraboloidal plunger which by sudden plunge or retraction generates dispersive waves with dominant period of 2 seconds, height of 0.2 feet, and length of 20 feet in water 2-1/2 feet deep. It was found that wave motions are (i) predicted by Green's Law, as modified for dispersive waves; and (ii) related to waves generated in the ocean by HE by the Froude scaling law. (Sinha-OEIS)
W74-03106

CALCULATION OF A SOLITARY WAVE SHOALING ON A SHALLOW SLOPE,
URS Corp., Burlingame, Calif.
J. D. Schwitters, and A. R. Kriebel.
Available from NTIS as AD-674 856, $6.00 paper copy, $1.45 microfiche. Final Report No URS-654-4, June 1968. 42 p, 7 fig, 1 tab, 6 ref, 3 append. Nonr-4959 (00).

Descriptors: *Waves (Water), *Shallow water, Coasts, *Mathematical models, Deformation, Beaches.
Identifiers: *Solitary waves, Beach slopes, *Wave run-up.

The numerical method developed by Wallace and Wonderley for calculating the deformation of a solitary wave moving onto a steep seawall was extended to beach slopes as small as 9 degrees. The calculated results show that the existing dipole flow model does not adequately represent the wave deformation for beach slopes this small. Fundamental changes in the mathematical model appear to be required for the same accuracy with which the dipole model represents undeformed solitary waves. It is recommended that before additional effort is expended on the present theoretical approach, existing machine programs should be used to calculate run-up on shallow slopes for comparison with experimental data. (Sinha - OEIS)
W74-03115

A DECISION-THEORETIC APPROACH TO UNCERTAINTY IN THE RETURN PERIOD OF MAXIMUM FLOW VOLUMES USING RAINFALL DATA,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 02A.
W74-03138

RANDOM DRILLING FOR WATER IN CARBONATE ROCKS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
R. R. Parizek, and L. J. Drew.
Publication No. 3, 1966. 22 p, 8 fig, 1 tab, 14 ref. OWRR A-005-PENN (6).

Descriptors: Wells, *Groundwater, Specific yield, Water yield, Carbonates, Porosity, Permeability, Fracture permeability, *Drilling, *Pennsylvania, *Water wells.
Identifiers: *Fracture traces, Aerial photography.

Statistical methods have been applied to well performance and aquifer characteristic studies frequently in recent years. This analysis illustrates probabilities involved in not taking fracture traces into consideration when prospecting for ground water near State College, Pennsylvania. Other factors, which to date are known not to have order of magnitude influences on yields of wells in carbonate rocks, are not considered. Objectives are to determine the results of random drilling for ground water in carbonate rocks in central Pennsylvania, to stress the importance of preserving suitable well sites for future urban use, and to compare approximate water costs of randomly located wells to wells located on fracture traces. Results showed wells drilled on or near a single fracture and at the intersection of two fracture traces with yields ranging from ten to one hundred times that of wells drilled in zones between fracture traces. (Staplin-NWWA)
W74-03141

GROUNDWATER MOVEMENT,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 04B.
W74-03142

PETROGRAPHY AND ENGINEERING PROPERTIES OF IGNEOUS ROCKS,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 08A.
W74-03143

PUMPED STORAGE DEVELOPMENT AND ITS ENVIRONMENTAL EFFECTS.

Proceedings of the International Conference on Pumped Storage Development and Its Environmental Effects, University of Wisconsin, Milwaukee, Sept 19-24, 1971. American Water Resources Association, Urbana, Illinois. 1971. 572 p.

Descriptors: *Pumped storage, *Reservoir storage, Resources, Resources development, Air pollution, Thermal pollution, Water pollution, Hydraulic machinery, Electrical equipment.
Identifiers: Moses Coulee, Autilon Lake, Austria, France, Norway, Italy, Thermalito, *Geotechnical problems, *Reversible pump/turbines, Tidal energy, *Pacific northwest, Spain, India.

Means are explored of meeting man's requirements for vast amounts of energy in a way that is compatible with his environment. An international conference of experts in the field present information on planning, design and construction of pumped storage schemes; geotechnical problems of pumped storage development; hydraulic machinery; electric machinery; role of pumped storage in regional power systems; importance of pumped storage in multi-purpose water resources development; environmental aspects of pumped storage development; and, environmental impact-political/administrative aspects. A bibliography of pumped storage development is presented. Pumped storage is emphasized as a vital constituent in a hydro-thermal power system where topography and hydrology are suitable, with further research needed for achieving greater operational flexibility and greater economy in design and operation. (Staplin-NWWA)
W74-03144

WELLBORE PRESSURE SURGES PRODUCED BY PIPE MOVEMENT,
Humble Oil and Refining Co., Houston, Tex.
J. A. Burkhardt.
Journal of Petroleum Technology, Vol 13, No 6, p 595-605, June 1961. 14 fig, 4 tab, 14 ref.

Descriptors: *Pressure, *Flow, *Mud, *Pipe, Laminar flow, Turbulent flow, Drilling fluids, Pressure measuring instruments, Hydraulics, Pipe, Casings, Velocity, Reynolds number, Rheology, Gels, Plasticity.
Identifiers: *Surge pressures, *Swabbing, *Viscous drag, Bingham plastic, Geometry coefficient.

Raising or lowering pipe in a liquid-filled hole produces momentary variations in pressure. Both negative pressure surges (swabbing) and positive surges (fracturing) may occur. Field measurements and theoretical studies were made to develop a quantitative description of surge pressures. Pressure changes were recorded by five pressure gauges located at various points in the borehole. An important positive pressure peak was found to occur as the casing moved with maximum velocity. Important negative peaks occurred as the casing was lifted from the slips and as the brakes were applied to stop pipe movement. Factors considered in the theoretical consideration of pressure-surge generation were the development of a gel by the mud, the inertia of the mud column, and the viscous drag of the mud column. Measurements agreed with theory that the most important pressure surge was due to viscous drag of the flowing mud. The theory of viscous-drag pressure surges was approximated by simplified graphs and calculation procedures to facilitate field use. Comparison of measured and predicted pressure surges showed that the method gave reliable results. (Gray-NWWA)
W74-03146

ESTIMATING SKIN EFFECT IN A PARTIALLY COMPLETED DAMAGED WELL,
Mobil Research and Development Corp., Dallas, Tex.
L. G. Jones, and J. W. Watts.
Journal of Petroleum Technology, Vol 23, No 2, p 249-252, February 1971. 2 fig, 7 ref.

Descriptors: *Permeability, *Flow, *Mathematical models, Wells, Withdrawal, Aquifers, Pressure.
Identifiers: *Perforations, *Sand consolidation, *Skin effect, Buildup, Formation damage.

The skin effect concept was created to allow mathematical treatment of the abnormal pressure drop due to the zone of formation damage around a producing well. If only part of the producing interval is perforated (a partially completed well), there is an apparent skin due to the constriction in flow. If formation damage is present around a partially completed well, flow into the well is no longer radial, and further modification of the skin equation is required. The calculation of two skins is suggested. The first assumes radial flow into the partially completed portion of the well in order to derive an approximate formula for calculating the skin due to formation damage. The skin calculated by this formula is compared with the value obtained using a finite difference model presented. An empirical correction to the approximate formula is developed. The example used to illustrate the method deals with the effect of sand consolidation to allow production from a highly permeable formation. The serious errors in estimated production rates that can result from neglecting the effects of permeability reduction in a partially completed zone are emphasized. (Gray-NWWA)
W74-03149

MUTUAL INTERFERENCE OF WATER WELLS,
Indiana Univ., Bloomington.
Y. M. Sternberg, and V. H. Scott.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 93, No HY4, p 169-181, July, 1967. 4 fig, 19 ref, 3 append.

Descriptors: Wells, *Groundwater, *Drawdown, Aquifer characteristics, Hydraulics, *Water wells, *Pumping, Pumps, Theis equation, Unsteady flow.
Identifiers: Steady state flow, Mutual interference, Pumping schedules, Head-capacity curve, Decreasing discharge.

As more wells are introduced into a given area, the discharge of each one of the existing wells may decrease with time although the total discharge from the aquifer may increase. This study develops general solutions to describe the relations between the drawdown of any one well in an array which is pumping at a decreasing rate, the duration of pumping, the distance from the well to the other wells, and the aquifer characteristics for an infinite homogenous confined aquifer. The decrease in discharge of each well is introduced by means of the head-capacity curve for each pump. Proper pumping schedules can be computed using this means of analysis. (Staplin-NWWA)
W74-03154

THE ROLE OF ROCK STRENGTH ANISOTROPY IN NATURAL HOLE DEVIATION,
Shell Oil Co., Houston, Tex.
R. T. McLamore.
Journal of Petroleum Technology, Vol 23, No 11, p 1313-1321, November, 1971. 10 fig, 6 ref.

Descriptors: *Bits, *Rock properties, *Deflection, Aniosotropy, Heterogeneity, Shear strength, Shear stress, Shape.
Identifiers: *Hole deviation, Carbide-insert bits, *Milled-cutter bits, Wedge-shaped tooth, Chips, Mohr-Couloub criterion.

A major problem in drilling is to drill a straight, vertical hole economically in dipping bedded rock. When a conventionally shaped wedge penetrates a dipping laminated aniosotropic rock the chips formed on each side of the wedge are not of equal size. This 'preferred chip formation' is related to hole deviation. Theoretical expressions were derived that predicted the occurrence of preferred chip formation in terms of (1) the anisotropic strength characteristic of the rock, (2) the dip of the beds, and (3) the included angle of the bit tooth. Laboratory tests were made on Berea sandstone and Green River shale (cut to simulate a 15 degree formation dip). Confining pressures were 5000 and 10,000 psi. Symmetrical chips were formed by single blow impacts on the sandstone regardless of the shape of the wedge. In contrast, the wedge geometry significantly affected the crater formed in the shale. A bit-tooth shape was designed that reduced the effect of the anisotropic rock in natural hole deviation. Experimental bits were put into field service in several areas where natural hole deviation is a common problem and results were favorable. (Gray-NWWA)
W74-03156

'MAXIMUM LOAD' CASING DESIGN,
Drilling Well Control , Inc., Lafayette, La.
C. M. Prentice.
Journal of Petroleum Technology, Vol 22, No 7, p 805-811, July, 1970. 14 fig, 5 ref.

Descriptors: *Casings, *Collapse, *Design standards, *Design criteria, Pressure, Tensile strength, Pipes, Strength of materials, Compressive strength, Buoyancy, Graphical methods.
Identifiers: *Burst load, Biaxial loading.

The objective in casing design is to satisfy the maximum loading requirements at minimum cost. The design types are: (1) surface casing, (2) intermediate casing, (3) intermediate casing with a drilling liner, (4) drilling liner, and (5) production casing. The basic design procedure is detailed for the intermediate casing and the modifications for the other strings are stated. Burst will dictate the design for most of the string. Accordingly, the least expensive weights and grades of casing that will satisfy the requirements for burst loading are chosen at the outset. Next the collapse load is evaluated and the casing sections are upgraded if necessary. The torsion load is then evaluated. The pipe is upgraded as may be required and the coupling types determined. The final step is a check on biaxial reductions in burst strength and collapse resistance caused by compression and tension loads, respectively. If these reductions show the strength of any part of the section to be less than the potential load, the section is again upgraded. The steps to be followed in the sequence are shown graphically. The procedure does not apply to the design of casing strings for deviated holes. (Gray-NWWA)
W74-03157

STEADY AND UNSTEADY FLOW TOWARDS GRAVITY WELLS,
Abadan Inst. of Tech. (Iran).
For primary bibliographic entry see Field 04B.
W74-03161

EASIER, MORE EXACT METHOD SPEEDS ANNULUS PRESSURE-LOSS CALCULATIONS,
Dresser Industries, Inc., Oilfield Products Div., Houston, Tex.
For primary bibliographic entry see Field 08G.
W74-03162

COMPUTING THE BAROMETRIC EFFICIENCY OF A WELL,
Geological Survey, Aiken, S.C., Savannah River Plant.
W. E. Clark.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 93, No HY4, p 93-98, July, 1967. 3 fig, 1 tab.

Descriptors: *Wells, *Groundwater, Hydraulics, Artesian wells, *Water levels.
Identifiers: *Earth tides, *Atmospheric pressure, *Barometric efficiency, Barograph.

The ratio of the change in the water level in a well to the change in atmospheric pressure that produces it is known as the barometric efficiency. Fluctuations of the water level caused by changes in atmospheric pressure often obscure other fluctuations that are of interest in hydrologic studies. One must know the barometric efficiency of a well to evaluate and elimate these changes from the water-level record. The method proposed in this study involves determining statistically the incremental changes in water level and in the barometric pressure. The change in W is plotted against the change in B, with a resulting sinusoidal graph. A straight line was drawn through the average of the plot, and the barometric efficiency was computed from the slope of the line. Results show that atmospheric pressure has a period of about twelve hours. Relationships between earth tides and changes in atmospheric pressure, both of which result in a fluctuating water level, are determined. (Campbell-NWWA)
W74-03167

WELL IMAGING AND FAULT DETECTION IN ANISOTROPIC RESERVOIRS,
Louisiana State Univ., Baton Rouge.
A. D. Overpeck, and W. R. Holden.
Journal of Petroleum Technology, Vol 22, No 10, p 1317-1325, Ocotber, 1970. 10 fig, 28 ref.

Descriptors: *Anisotropy, *Permeability, *Porous media, Aquifer characteristics, Boundary layers, Permeability, Flow, Pressure, Darcy's law, Faults (Geologic), Isotropy.
Identifiers: *Well imaging, Streamline tracing, Flux vector, *Anisotropic reservoirs.

A mathematical study was made of the effect of permeability anisotropy on well-imaging techniques. A general imaging equation was developed that led to certain conclusions, as follows. The orientation of the boundary with the principal axes of the finite system affects image well location. The conventional direct mirror imaging technique that is applied in isotropic media is valid for anisotropic media only when the boundary orientation is 0 or 90 degrees. Anisotropy does not affect the detection or indication of linear boundaries in the vicinity of a test well when pressure history analyses are used. A twofold change in slope should be realized in both pressure buildup and drawdown plots. Any isotropic method of analysis for calculating the normal distance to a boundary in an otherwise anisotropic system can lead to sizable error for permeability ratios no larger than 1.5. With proper correction, the apparent distance to a boundary found by using isotropic methods can be adapted to anisotropic systems. (Gray-NWWA)
W74-03168

DOUBLE-ELECTRODE METHOD OF SPONTANEOUS POTENTIAL LOGGING,
Shell Oil Co., Los Angeles, Calif.
For primary bibliographic entry see Field 08G.
W74-03170

8C. Hydraulic Machinery

THE DENVER SYSTEM OF CONTROLS,
Denver Water Dept., Colo.
For primary bibliographic entry see Field 05F.
W74-02854

INDUSTRIAL AND HIGH VELOCITY METERING,
Philadelphia Water Dept., Pa.
For primary bibliographic entry see Field 05F.
W74-02858

MHD CENTRAL POWER: A STATUS REPORT,
Tennessee Univ., Space Inst., Tullahoma.
For primary bibliographic entry see Field 05B.
W74-02871

EFFICIENT FLOOD CONTROL OF DAMS EQUIPPED WITH CREST GATES,
S. M. Nicol.
The Civil Engineer in South Africa, Vol 15, No 7, p 186-189, July, 1973.

Descriptors: *Floods, *Flood control, *Flood discharge, *Gates, Dams, Discharge (Water), Hydrograph analysis, Flood peak, Peak discharge, Inflow, Reservoir operation, Regulation, Flood forecasting.
Identifiers: Flood absorption, Duration of Peak discharge.

Guidelines are presented for an efficient flood control procedure applicable to dams equipped with crest gates to regulate the release of water. The method is presented for the general case but can be applied to determine the optimum discharge from a particular dam during a flood by inserting into the formulae the relevant data pertaining to that dam and its catchment. (DWA)
W74-02911

PROTECTING OFFSHORE STRUCTURES FROM ICE,
Amoco Production Co., Tulsa, Okla. (assignee)
G. C. Howard.
U. S. Patent No. 3,766,737, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1213, October 23, 1973.

Descriptors: *Patents, *Ice breakup, *Lake ice, *Sea ice, Platforms, Vessels, *Offshore platforms, Structures, Hydraulic machinery.
Identifiers: *Ice trenching machines, Sheet ice.

A method is described for protecting a structure such as a vessel or platform located in water covered with sheet ice. An ice trenching machine is suspended from a boom supported at the top of the structure. The ice trenching machine removes ice in a circular path at a rate approximately equal to the rate of movement of the sheet ice toward the protected structure. The boom can be moved entirely around the top of the structure so that a trench can be cut in the ice in any direction from the structure or to completely surround it. (Sinha-OEIS)
W74-03013

BENTHIC DREDGE CONSTRUCTION,
Trippensee Corp., Saginaw, Mich. (assignee)
T. J. Wetherbee.
U. S. Patent No. 3,762,078, 4 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 915, No 1, p 38, October 2, 1973.

Descriptors: *Patents, Sampling, *Dredges, Rivers, *Water supply, *Channel improvement, Equipment.

A dredge is adapted for taking samples from the bottom of a body of water in consideration of channel improvement and/or in the study of any water body. It comprises a hollow body open at its top and bottom, but provided at both its top and its bottom with closures movable between open and closed positions and biased to their closed positions. The top and bottom closures are equipped with means for latching the closures in their open positions. A latch release mechanism is provided for effecting release of the closure latch members to enable the closures to move from their open positions to their closed positions. (Sinha-OEIS)
W74-03022

PUMPED STORAGE DEVELOPMENT AND ITS ENVIRONMENTAL EFFECTS.
For primary bibliographic entry see Field 08B.
W74-03144

DEEP WELL SUBMERSIBLES ARE GROWING,
KSB Pump Co., East Rutherford, N.J.
E. M. Schuck.
Water and Wastes Engineering, Vol 10, No 11, p F-18 - F-20, F-22, November 1973. 3 fig.

Descriptors: *Deep-well pumping, *Pumps, Turbines, *Hydraulic machinery, Impellers, Intakes, *Electric motors, *Estimated costs.
Identifiers: PVC, Water-filled submersibles, *Electric motor design, Pump design.

Waterfilled, deep-well submersible pumps are finally coming into their own in the United States. Originally developed in the USSR in the 1920's the pump was not introduced in this country until the 1950's but in the last 20 years has become a major item for use in domestic water systems. There are 3 types of these pumps in use today; radial flow, axial flow, and mixed flow, all of which come in both high and low voltage configurations. A discussion of each type, proper voltage application, and motor design is presented. Also presented are formulas for computing required pump horsepower. Stressed is the opinion that when all factors both economic and environmental are carefully considered in system design analysis, the submersible pump can offer an excellent choice. (Hunt-NWWA)
W74-03147

8D. Soil Mechanics

MUDFLOW PROPERTIES AND PATTERNS (O SVOYSTVAKH I ZAKONOMERNOSTYAKH SELEVYKH POTOKOV),
For primary bibliographic entry see Field 02J.
W74-02750

UNSTEADY FLOW IN SEWER NETWORKS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W74-03095

8E. Rock Mechanics and Geology

FEASIBILITY STUDY: HYDRAULIC FRACTURING OF DRILLED WATER WELLS TO STIMULATE THEIR YIELD,
Water Resource Research Center.
For primary bibliographic entry see Field 08B.
W74-02659

STIMULATION MODES OF GEOTHERMAL AQUIFERS,
Stanford Univ., Calif.
For primary bibliographic entry see Field 04B.
W74-02876

RANDOM DRILLING FOR WATER IN CARBONATE ROCKS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 08B.
W74-03141

PETROGRAPHY AND ENGINEERING PROPERTIES OF IGNEOUS ROCKS,
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 08A.
W74-03143

PHYSICAL PROPERTIES OF SOME TYPICAL FOUNDATION ROCKS.
Bureau of Reclamation, Denver, Colo.

Concrete Laboratory Report No. SP-39, 1953. 75 p, 52 fig, 3 tab.

Descriptors: *Stress, *Shear strength, Mohr envelope, *Foundation rocks, Foundations, *Petrology, Physical properties, *Rock foundations, *Rock properties, Strength, Elasticity, Permeability, Porosity, Shear, Poisson ratio, Strain, Petrography.

This report concerns a collection of the basic physical properties of rocks. It gives the location and geologic occurrence of each rock type tested; a petrographic description; and, in most cases, the following properties as determined from laboratory tests of core samples: compressive strength, triaxial strength in terms of the principal stress relation and the equation of Mohr's envelope (shearing strength and coefficient of internal friction), modulus of elasticity (static and dynamic), Poisson's ratio, dynamic modulus of rigidity, specific gravity, and porosity. The average test value is given together with the range and the number of test specimens. The methods and procedures used in each test are described, and results are summarized on individual rock data sheets. Data given here are of most importance in determining boundary conditions for the accurate computation of stress, and provide a substantial basic knowledge as to the behavior of foundation materials under shearing forces. (Staplin-NWWA)
W74-03145

EFFECT OF HARDNESS REDUCERS ON FAILURE CHARACTERISTICS OF ROCK,
Esso Production Research Co., Houston, Tex.
L. H. Robinson.
Society of Petroleum Engineers Journal, Vol 7, No 3, p 295-300, September 1967. 4 fig, 2 tab, 5 ref.

Descriptors: Rock properties, Drilling, *Drilling fluids, Rotary drilling, *Compressive strength, Limestone, Sandstone, *Sodium compounds, Chemicals, Organic compounds, *Surfactants.
Identifiers: *Microbit drilling, Indiana limestone, Sodium citrate, Sodium azelate, *Triaxial compression tests, *Brittle failure, *Plastic failure.

Triaxial compression tests on Indiana limestone indicated that chemicals in the pore liquid can increase or decrease the rock strength in plastic failure but not in brittle failure. Of the twenty products tested, sodium citrate was the most effective yield strength reducer (25%). Sodium azelate was only slightly less effective under conditions of plastic failure of Indiana limestone but no reduction in strength occurred under conditions of brittle failure in tests on Indiana limestone and Pictured Cliffs sandstone. Sodium salts of dicarboxylic acids having even-number carbon-atom chains increased the yield strength. Microbit drilling tests showed no effect of the chemicals when drilling with zero pressure differential. At 2000 psi differential pressure, with an odd-number carbon chain compound in the circulating water, drilling rates were slower than with water. Drag bit drilling rate with the compound was faster than with water. The opposite effect was observed with an even-number carbon chain compound. (Gray-NWWA)
W74-03148

THE ROLE OF ROCK STRENGTH ANISOTROPY IN NATURAL HOLE DEVIATION,
Shell Oil Co., Houston, Tex.
For primary bibliographic entry see Field 08B.
W74-03156

TERRADYNAMICS,
National Water Well Association, Houston, Tex., Research Facility.
M. D. Campbell.
Water Well Journal, Vol 25, No 10, p 42-44, October, 1971. 5 fig.

Descriptors: *Groundwater, Prospecting, Locating, *Remote sensing, Subsurface investigations, Rocks, Sediments.
Identifiers: *Terradynamics, *Earth-penetration, *Projectiles, Deceleration times.

Scientific studies of large scale earth-penetration events were undertaken in 1962. By June of 1967, the programs involved a total of 692 earth-penetration events, of which 382 were instrumented to record the deceleration experienced by projectiles used to effect the penetrations. The studies have been made in both soil and rock materials. Penetration approaching 100 feet in depth has been accomplished and depths up to 200 or 300 feet in either unconsolidated or consolidated material are reported as possible. Different soil and rock types allow the projectile to pass through them at different velocities, therefore deceleration times can be used to remotely sense lithologies if correctly interpreted and used with sufficient control. Additional potential applications include hydrological studies for location of water table, location of bedrock for reservoir sites, emplacing deep sea anchors, and analysis of ore deposits. (Hunt-NWWA)
W74-03165

PULSED NUCLEAR MAGNETIC RESONANCE STUDIES OF POROSITY, MOVABLE FLUID, AND PERMEABILITY OF SANDSTONES,
Chevron Oil Field Research Co., La Habra, Calif.
For primary bibliographic entry see Field 08G.
W74-03166

8F. Concrete

SEALING ABANDONED WATER WELLS.
Illinois State Dept. of Mines and Minerals, Springfield. Div. of Oil and Gas.

Water Well Journal, Vol 27, No 4, p 31-32, 34, April, 1973.

Descriptors: *Soil sealants, *Grouting, *Watertight, Construction materials, Cement grouting, Clays, Concretes, Aggregates, Wells, *Water wells.
Identifiers: *Well sealing, Neat cement, Artesian flow, Creviced rock formations, Noncreviced rock formations. Multiple aquifers, Unconsolidated formations.

Factors to be considered in sealing an abandoned water well are identified. These include eliminating physical hazard, preventing contamination of ground water, conserving yield and hydrostatic head of aquifers, and preventing intermingling of desirable and undesirable waters. Restoration of the controlling geological conditions that existed before the well was drilled and constructed are stressed. Methods and materials are considered for sealing wells in unconsolidated formations, wells extending into creviced rock formations, wells extending into non-creviced rock formations, wells extending into more than one aquifer, and wells with artesian flow. Characteristics and distinctive properties of different sealing materials are discussed. (Campbell-NWWA)
W74-03169

8G. Materials

ADVANCES IN NORTH AMERICAN AVALANCHE TECHNOLOGY: 1972 SYMPOSIUM.
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02C.
W74-02740

HEAT TRANSFER FOULING THROUGH GROWTH OF CALCAREOUS FILM DEPOSITS,
California Univ., Berkeley.
T. R. Galloway.
International Journal of Heat and Mass Transfer, Vol 16, No 2, p 443-460, 1973. 19 fig, 1 tab, 9 ref.

Descriptors: *Heat transfer, *Fouling, *Design, *Films, *Diffusion, Fluid mechanics, Equipment, Corrosion control, Laboratory tests, Slimes, Heat exchanges, Chemical reactions, Model Studies, Boundary layers, Mass transfer, Reynolds number, Thermal diffusivity, Transfer coefficients.

Overdesign of heat transfer equipment due to fouling is widespread and costly. A model of fouling is presented in which the film growth rate is dependent upon the diffusional resistance through the film and the mass transfer boundary layer outside the film; with resistance taken in series. The phenomenon responsible for the deposits building up on the surface in a film layer for this case of calcareous film appears to be one involving heterogeneous crystallization. A study based on an electrochemical system which offers the possibility of experimentally monitoring the reaction rate and film growth is presented. A model for the growth rate of films is developed in terms of film thickness as a function of time, geometry and fluid mechanics. For the heat transfer fouling, resistance can be obtained by dividing thickness by either diffusivity or conductivity, taken as effective values within the film. One must be careful to apply this growth law to fouling mechanisms where deposit is formed as a result of the transported component diffusing through the barrier and reacting with a component appearing at the surface in excess. (Jerome-Vanderbilt)
W74-02882

SURVEY OF RAIN RUN-OFF HARVESTING,
National Inst. for Water Research, Windhoek (South-West Africa).
For primary bibliographic entry see Field 03B.
W74-02915

PHYSICAL PROPERTIES OF SOME TYPICAL FOUNDATION ROCKS.
Bureau of Reclamation, Denver, Colo.
For primary bibliographic entry see Field 08E.
W74-03145

EFFECT OF HARDNESS REDUCERS ON FAILURE CHARACTERISTICS OF ROCK,
Esso Production Research Co., Houston, Tex.
For primary bibliographic entry see Field 08E.
W74-03148

ESTIMATING SKIN EFFECT IN A PARTIALLY COMPLETED DAMAGED WELL,
Mobil Research and Development Corp., Dallas, Tex.
For primary bibliographic entry see Field 08B.
W74-03149

PROPER HYDRATION OF CLAYS FOR ROCK PROPERTY DETERMINATIONS,
Core Lab., Inc., Dallas, Tex.

For primary bibliographic entry see Field 02F.
W74-03153

THE EFFECT OF THINNERS ON THE FABRIC OF CLAY MUDS AND GELS,
Phillips Petroleum Co., Bartlesville, Okla.
R. L. Borst, and F. J. Shell.
Journal of Petroleum Technology, Vol 23, No 10, p 1193-1201, October, 1971. 14 fig, 2 tab, 28 ref.

Descriptors: *Electron microscopy, *Bentonite, *Thin films, *Gels, Montmorillonite, Colloids, Drilling fluids, Muds, Chromium, Freeze drying, X-ray diffraction, Rheology.
Identifiers: *Mud thinners, *Lignosulfonates, Base exchange, Tannin.

The scanning electron microscope was used to examine the fabric of bentonite clay-in-water muds. Fabric is the three-dimensional arrangement of clay particles and fluid-filled voids. A rapid freeze-drying technique was introduced to facilitate the study of the effect of mud-thinning agents and heat on the bentonite gel. The method showed that the gel fabric of a bentonite mud consists of a network of clay films. Face to face bonding between clay layers imparts rigidity to the gel. Both heat and sodium hydroxide cause a decrease in the inter-layer spacing of the clay films and make a more dense film. A heavy metal lignosulfonate thinner at room temperature had no apparent effect on the clay fabric. On aging at 350F, heavy metal ions exchanged for sodium in the clay and thicker films or packets were formed. The heavy metal lignosulfonate is associated with the basal surfaces of the clay. A new thinner, a sulfomethylated tannin and a chromium compound, appeared to bond to the edge of the clay crystallite and caused disaggregation of the clay film. The disruption of face to face bonding of the clay layers thins the mud even after aging at high temperature. The new technique appears to offer promise of a visual explanation for some of the perplexing problems of drilling mud behavior. (Gray-NWWA)
W74-03159

SUN TREATS COOLING WATER WITHOUT CHROMATES FOR CORROSION PROTECTION,
Sun Oil Co., Philadelphia, Pa.
O. M. Elliott.
Oil and Gas Journal, Vol 71, No 29, p 104-105, July, 1973. 1 fig.

Descriptors: Corrosion, Oxidation, Scaling, *Desalination, *Corrosion control, Coatings, Films, *Deaeration, MATERIALS, *Dissolved oxygen, *Cooling water.
Identifiers: Ryznar calcium carbonate indices, Crystal growth deactivators, Poly phosphates, Zinc salts, Nitrites, Boron compounds.

Sun Oil Co. experiences over the years with corrosion protection systems have resulted in low chromate usage. Cooling water systems should be built of materials that can withstand the corrosive conditions. Otherwise, they must be coated or polarized in some manner. Chromate treatment produces a protective barrier on most common metals through a broad pH range. Chromium, however, is not the only economical chemical that does this. Calcium carbonate will also do this, if the heat exchanger coolers are generously designed. Zinc salts have reduced corrosion with low level, haxametaphosphate treatment. Zinc sulfate may be added in trace amounts to the circulating cooling water. Deaeration is another way. Poly and organic phosphates, chromates, silicates, zinc salts, nitrites, boron compounds and emulsifying oils are some other ways. (Smith-NWWA)
W74-03160

EASIER, MORE EXACT METHOD SPEEDS ANNULUS PRESSURE-LOSS CALCULATIONS,
Dresser Industries, Inc., Oilfield Products Div., Houston, Tex.
G. Forbes.
The Oil and Gas Journal, Vol 70, No 31, p 110-111, July 31, 1972. 4 fig, 6 ref.

Descriptors: *Pressure, Hydraulics, *Mud, *Drilling fluids, Flow laminar flow, Vicosity, Rheology, Hydraulic radius, Shear stress, Non-Newtonian flow.
Identifiers: *Annulus pressure loss, *Power low, Bingham plastic, Fonn viscometer.

In order to make a reliable calculation of the pressure loss in the annulus while circulating drilling mud under steady-state, laminar flow conditions, the shear rate in the annulus and the shear stress at that shear rate must be known. The shear rate in the annulus can be expressed as the equivalent wall-shear rate in revolutions per minute. The relation between r.p.m. and dial reading on the Fonn multi-speed rotational viscometer is illustrated for Gingham plastic and power law behavior, and the conclusion is that most muds follow the power law relationship. The Fonn dial readings are plotted against r.p.m. on log-log paper. A straight line is drawn through the 3 and 6 r.p.m. points. Another straight line is drawn through the 100, 200, 300, and 600 r.p.m. points. The dial reading corresponding to the calculated shear rate in the annulus (in r.p.m.) is used to calculate the pressure loss in the annulus for each segment of differing borehole and drill pipe diameters. (Gray-NWWA)
W74-03162

TERRADYNAMICS,
National Water Well Association, Houston, Tex., Research Facility.
For primary bibliographic entry see Field 08E.
W74-03165

PULSED NUCLEAR MAGNETIC RESONANCE STUDIES OF POROSITY, MOVABLE FLUID, AND PERMEABILITY OF SANDSTONES,
Chevron Oil Field Research Co., La Habra, Calif.
A. Timur.
Journal of Petroleum Technology, Vol 21, No 6, p 775-786, June, 1969. 16 fig, 3 tab, 14 ref.

Descriptors: *Nuclear magnetic resonance, *Porosity, *Permeability, Analytical techniques, Porous media, Rock properties, Physical properties, Saturation, Non-destructive tests, *Sandstones.
Identifiers: *Spin-echo apparatus, *Pulsed NMR, Movable fluid.

Pulsed Nuclear Magnetic Resonance (NMR) (spin-echo) apparatus provides a fast, non-distinctive laboratory method of determining porosity, movable fluid, and permeability of sandstone samples. A model of porous media was developed from an analysis of NMR measurements and measurements were made on over 150 samples of sandstones to evaluate the predictions of the model. In the three component NMR model, the pore spaces of a porous medium are divided into three groups, based on their surface-to-volume ratio distribution as computed from relaxation-time measurements. The porosity values measured with the pulsed NMR apparatus were found to be within 0.5 porosity unit of those obtained by weighing. Residual (irreducible) saturation from capillary pressure curves indicated that the measured values of movable fluid specified the maximum amount of producible fluid. To determine permeability through NMR measurements, a calibration test is required. After making this test for a given field, permeability can be estimated from the appropriate empirical parameters. The NMR method requires only about five minutes of measurement of a saturated sandstone with spin-echo apparatus and a few seconds of computer time to determine porosity, movable fluid and permeability. Further saving in time over conventional methods results because the NMR method does not require shaping of the rock samples. (Gray-NWWA)
W74-03166

COMPUTING THE BAROMETRIC EFFICIENCY OF A WELL,
Geological Survey, Aiken, S.C., Savannah River Plant.
For primary bibliographic entry see Field 08B.
W74-03167

WELL IMAGING AND FAULT DETECTION IN ANISOTROPIC RESERVOIRS,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 08B.
W74-03168

A DOUBLE-ELECTRODE METHOD OF SPONTANEOUS POTENTIAL LOGGING,
Shell Oil Co., Los Angeles, Calif.
E. A. Koerperich.
Journal of Petroleum Technology, Vol 22, No 11, p 1437-1446, November, 1970. 13 fig, 9 ref.

Descriptors: *Electrical Well Logging, *Electrodes, *Sands, *Shales, *Porous media, Computers, Resistivity, Mud.
Identifiers: Spontaneous potential, *Wellbore currents, Delta V curve, Sand count, Noise effects, Electrode spacing, Voltage drop.

The double electrode method provides a means of determining permeable bed boundary locations and bed thicknesses. Well-bore SP currents generally have maximum intensity adjacent to or very near the sand-shale boundary. Two downhole electrodes, separated by some measured distance, simultaneously transmit voltage pulses to the surface while their algebraic difference is recorded (the Delta V curve). The Delta V curve reflects the points ofmaximum current intensity by curve peaks of opposite polarity at the upper and lower sand boundaries. The vertical distance between the two peaks is the bed thickness. The use of two downhole SP electrodes having a common surface ground serves to eliminate most noise signals. Several methods of obtaining the Delta V curve with conventional equipment are discussed. Sand bed boundaries were satisfactorily defined when electrode spacing was less than current-zone thickness. A short spacing should be used to define thin beds. Either circuitry or a computer can be used to store the conventional SP signal and then recombine it with the unstored signal. The Delta V curve may be adapted to computerized sand counting, thereby affording the advantage of mechanical consistency, free from human interpretation and bias. (Gray-NWWA)
W74-03170

8H. Rapid Excavation

CONTROLLED RELEASE OF AVALANCHES BY EXPLOSIVES,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02C.
W74-02746

THE JACKING METHOD IN TUNNEL CONSTRUCTION,
Greater Chicago Metropolitan Sanitary District, Ill.
For primary bibliographic entry see Field 08A.
W74-02855

FEASIBILITY OF MODELING RUN-UP EFFECTS OF DISPERSIVE WATER WAVES,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 08B.
W74-03106

8I. Fisheries Engineering

PARAMETRIC DETERMINATION OF MINIMUM STREAMFLOW FOR TROUT,
Wyoming Univ., Laramie. Dept. of Civil Engineering.
T. A. Wesche.
Available from the National Technical Information Service as PB-226 417 $7.75 in paper copy; $1.45 in microfiche. M Sc Thesis, May 1973. 102 p, 40 fig, 6 tab, 27 ref, 3 append. OWRR B-007-WYO (2).

Descriptors: *Streamflow, *Water requirements, *Fish populations, *Trout, *Wyoming, Data Collections, Flow rates, Low flow, Depth, Channel morphology, Vegetation, Hydrologic data, Brown trout, Aquatic life, Cold-water fish.

A suitable minimum flow in a stream channel for the preservation of trout populations was studied in Wyoming. Three types of physical stream characteristics and the change observed in them between various discharge levels, based on the average daily flow (ADF), include: (1) hydrologic parameters; (2) surface area and its composition, based on water depth and velocity; and (3) available trout cover. Portions of Douglas Creek and Hog Park Creek, relatively small streams (average daily flows approximately 30 cfs) located in the North Platte River drainage of southeastern Wyoming, were investigated in the summer and fall of 1972 at 200%, 100% 50%, 25%, and 12.5% ADF. Water depth, velocity, cross-sectional area, wetted perimeter, hydraulic radius, top width, total surface area, surface area having a velocity of at least 1.0 feet per second, surface area of depth 0.5 feet or greater, and available brown trout cover were found to decrease at the greatest rate for the discharge reduction interval from 25% to 12.5% ADF. As a minimum flow, a discharge in the 25% ADF range will avoid the flow range for which the rate of habitat decrease is greatest. (Woodard-USGS)
W74-02670

STUDIES ON SELECTED MYXOBACTERIA PATHOGENIC FOR FISHES AND ON BACTERIAL GILL DISEASE IN HATCHERY--REARED SALMONIDS,
Bureau of Sport Fisheries and Wildlife, Kearneysville, W. Va. Eastern Fish Disease Lab.
For primary bibliographic entry see Field 05C.
W74-02672

ROTENONE METHODS IN A LARGE RIVER SYSTEM,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
C. H. Hocutt, P. S. Hambrick, and M. T. Masnik.
Archiv fur Hydrolrologie, Vol 72, No 2, p 245-252, July 1973. 1 fig, 2 tab, 12 ref.

Descriptors: *Fish types, Rivers, *Virginia, *Fish taxonomy, Fish populations, Classification, Methodology, *Rotenone, *Fish control agents, Nets, Sampling.
Identifiers: *New River (Va), Fish species, Potassium permanganate.

The use of rotenone, block net, and potassium permanganate was an effective method for sampling fishes in a large river system. Methods developed were responsible for establishing nine distributional records of fishes in the main-channel of New River in Virginia, including the addition of three species (Cottus b. bairdi, Etheostoma caeruleum and Etheostoma osburni) to the known fauna. Rotenone resulted in higher numbers of species and specimens collected per locality than by seining. Analyses of the data revealed consistently higher diversity indexes (SUMD) for rotenone collections. (Woodard-USGS)
W74-02736

PRELIMINARY REPORT ON SMALL FISHES FROM THE HENDRIK VERWOED DAM, ORANGE RIVER,
J. L. B. Smith Inst. of Ichthyology, Grahamstown (South Africa).
For primary bibliographic entry see Field 02H.
W74-02914

PACIFIC SALMON AQUACULTURE PROGRAM--INCUBATION AND CULTIVATION PHASES,
Ocean Systems, Inc., Reston, Va.
For primary bibliographic entry see Field 02L.
W74-03028

POPULATION STUDIES OF BIGMOUTH BUFFALO IN CORALVILLE RESERVOIR WITH SPECIAL REFERENCE TO COMMERCIAL HARVEST,
Iowa State Conservation Commission, Des Moines. Fisheries Section.
L. Mitzner.
Available from NTIS, Springfield, Va. 22151 as COM-73-10074 Price $3.00 printed copy; $1.45 microfiche. Iowa Fisheries Research Technical Series No 72-3, 1972. 37 p, 7 fig, 12 tab, 26 ref.

Descriptors: *Fish populations, *Commercial fishing, *Reservoirs, *Iowa, Surveys, Sampling, Fish types, Methodology, Nets, Fish harvest.
Identifiers: *Coralville Reservoir (Iowa), *Bigmouth buffalo fish.

Investigations to determine the magnitude of commercial fish populations and the rate they could be exploited were conducted at Coralville Reservoir, Iowa, during the 5 year period, 1966-1970. Population estimates indicated bigmouth buffalo were most abundant of any species with approximately 370 per acre and standing crop was estimated at 1,046 lbs per acre. An experimental net fishery was conducted in 1967 and 1968 to determine affects of exploitation. The fishery exploited 13 lbs per acre of carp, carpsucker, buffalo and channel catfish. Fish were removed by frame nets, slat traps, bait nets, and gill nets. Total gear effort was 5,616 net days. An additional 125 lbs per acre were lost by winter kill resulting from oxygen depletion in February 1969. Life history and population statistics showed no change due to exploitation, even with the additional mortality from winter kill. Growth in body length of bigmouth buffalo expressed by the Walford line was 0.79. Mean instantaneous total mortality was 0.40. Length-width relationships and condition factors were computed for comparison during each year of the investigation. Selectivity of gill nets was studied in 1970 to determine their feasibility for use in a commercial fishery. Total catch was 2,267 fish in 256 net days and was dominated by bigmouth buffalo. Catch success of buffalo in the 4-, 5-, 6-, and 7-inch mesh size was 3.7, 4.6, 3.3 and 4.0 fish per net day. Catch from May 12 to August 14 ranged from 6.9-1.4 fish per net day. Spawning activity in May and June resulted in highest catch rates. (Woodard-USGS)
W74-03036

09. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

ANNUAL REPORT, '71-'72.
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 05G.
W74-03092

AN INVENTORY OF ENVIRONMENTAL RESOURCES RESEARCH IN PROGRESS, COLORADO STATE UNIVERSITY.
Colorado State Univ., Fort Collins. Environmental Resources Center.
For primary bibliographic entry see Field 06G.
W74-03133

THE UNIVERSITY AND PUBLIC POLICY IN WATER RESOURCES, PROCEEDINGS UCOWR ANNUAL MEETING HELD JULY 29-AUGUST 1, 1973 AT TEXAS TECH UNIVERSITY, LUBBOCK, TEXAS.
For primary bibliographic entry see Field 06B.
W74-03172

IMPLICATIONS OF THE NATIONAL WATER COMMISSION REPORT FOR THE UNIVERSITIES COUNCIL ON WATER RESOURCES,
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06B.
W74-03173

COMMENTS ON THE REPORT OF THE NATIONAL WATER COMMISSION,
Resources for the Future, Inc., Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-03174

OPPORTUNITIES FOR REGIONAL COORDINATION AND COOPERATION IN WATER RESOURCES RESEARCH,
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 06B.
W74-03175

HIGHLIGHTS AND ISSUES OF THE 1972 AMENDMENTS TO THE FEDERAL WATER POLLUTION CONTROL ACT,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 06B.
W74-03180

A CHALLENGE TO THE ACADEMIC COMMUNITY: ECONOMICS AND INSTITUTIONS IN THE REPORT OF THE NATIONAL WATER COMMISSION,
New York State Coll. of Agricultural and Life Sciences, Ithaca. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W74-03184

9D. Grants, Contracts, and Research Act Allotments

ANNUAL REPORT, '71-'72.
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 05G.
W74-03092

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

PRIMARY PUBLICATIONS IN ENVIRONMENTAL SCIENCE,
American Chemical Society, Washington, D.C.
D. H. M. Bowen.

In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 170-185, May 1973. 1 tab.

Descriptors: *Publications, *Environment, Ecology, Information exchange, Documentation.

The primary publications that carry scientific and technical information in the environmental field are listed and described. The type of information, level of understanding needed, the cost, and the availability of these publications are discussed. Environmental information is to be found in a large number of primary scientific and technical publications. That number is certainly in the hundreds. The most reliable information (in the scientific sense) is to be found in publications that are the most expensive, the least available, and the most difficult to read and understand. Conversely, publications that are inexpensive, easy to read, and easily available tend to sacrifice accuracy and scientific objectivity. (See also W74-03040) (Knapp-USGS)
W74-03044

STORAGE AND RETRIEVAL OF WATER QUALITY DATA--TRAINING MANUAL.
Environmental Protection Agency, Cincinnati, Ohio. Water Quality Office.
For primary bibliographic entry see Field 05A.
W74-03171

10B. Reference and Retrieval

DEVELOPMENT OF A PROTOTYPE SEARCH AND RETRIVAL NETWORK FOR WATER RESOURCE INFORMATION,
Oklahoma Univ. Research Inst., Norman.
J. L. Morrison, L. G. Greenwell, and N. B. Hilsen.
Available from the National Technical Information Service as PB-226 569 $4.25 in paper copy, $1.45 in microfiche. Final Project Report for Grant 14-31-0001-3743, February 1, 1972 to January 31, 1973. 110p. OWRR W-145 (no 3743) (1)

Descriptors: Water resources, *Data transmission, *Data processing, *Computer programs, *Data storage and retrieval, Bibliographies, Networks, *Information retrieval, Methodology, Publications, Abstracts, Costs, Evaluation, Telemetry.
Identifiers: *Water resources scientific information, Data retrieval system, Data search.

A prototype information network for retrieval and dissemination of WRSIC's water resources research information has been evaluated. The network consists of three information processing centers located at the University of Wisconsin, Cornell University and North Carolina State University. Each information processing center served as a focal point for a multi-state region to process users requests for bibliographic information available on the WRSIC data base. These centers are linked via remote terminal to computer facilities at the University of Oklahoma and at Oklahoma State University. The University of Oklahoma Research Institute furnished technical support and functioned as scheduler, coordinator and evaluator of the network operations. Approximately fifty percent of the users were contacted and questioned for their evaluation of the system. The majority of users were satisfied with the results of their search, and nearly all would use the system again if the need arose.
W74-02821

NATIONAL ENVIRONMENTAL INFORMATION SYMPOSIUM: AN AGENDA FOR PROGRESS--PAPERS AND REPORTS, VOLUME 2.
Environmental Protection Agency, Washington, D.C.
Available from NTIS, Springfield, Va. 22151 as PB-219 071 Price $12.50 printed copy; $1.45 microfiche. Proceedings of Symposium held at Cincinnati, Ohio, September 24-27, 1972: Environmental Protection Agency Publication, May 1973. 567 p.

Descriptors: *Information exchange, Bibliographies, Publications, Data storage and retrieval, Data collections, Documentation, Indexing, Information retrieval, Environment, Ecology.
Identifiers: *Information centers.

The National Environmental Information Symposium was held in Cincinnati, Ohio, on September 24-27, 1972. The purpose of the symposium sponsored by the Environmental Protection Agency, was to outline and clarify the difficulties of interchanging information, to present the user of environmental information with a review of the service available, their location, accessibility, and cost, and to describe some of the solutions already being formulated. The program was structured into four categories: scientific and technical; legal, legislative and regulatory; management and planning; and socioeconomic. The information services covered included information and data centers, publications, and document services and referral activities. (See also W74-03041 thru W74-03053) (Knapp-USGS)
W74-03040

A SURVEY OF THE BIOLOGICAL-SCIENCE--RELATED INFORMATION CENTERS LISTED IN THE SEQUIP REPORT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 10D.
W74-03041

INFORMATION CENTERS CONCERNED WITH ENVIRONMENTAL MATTERS: PHYSICAL SCIENCE AND TECHNOLOGY,
National Bureau of Standards, Washington, D.C.
For primary bibliographic entry see Field 10D.
W74-03042

FEDERAL ENVIRONMENTAL DATA CENTERS AND SYSTEMS,
National Oceanographic Data Center, Washington, D.C.
For primary bibliographic entry see Field 10D.
W74-03043

PRIMARY PUBLICATIONS IN ENVIRONMENTAL SCIENCE,
American Chemical Society, Washington, D.C.
For primary bibliographic entry see Field 10A.
W74-03044

TECHNICAL AND SCIENTIFIC JOURNALS,
Pollution Abstracts, Inc., La Jolla, Calif.
For primary bibliographic entry see Field 10C.
W74-03045

DOCUMENT SERVICES,
National Technical Information Service, Springfield, Va.
For primary bibliographic entry see Field 10C.
W74-03046

REFERRAL ACTIVITIES AND OTHER NON-BIBLIOGRAPHIC INFORMATION SERVICES,
Library of Congress, Washington, D.C. Science and Technology Div.
M. W. McFarland.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 243-278, May 1973. Append.

Descriptors: *Abstracts, *Information exchange, Publications, Documentation, Bibliographies, Libraries, Environment, Ecology, Water resources, Information retrival, Indexing.
Identifiers: *Information services.

Nondocumentary information services, including referral activities, are described. The Library of Congress is the site of, and operates the National Referral Center. The National Referral Center has three basic tasks: to inventory all significant U.S. information resources in science and technology; to provide any organization or individual working in science and technology, on request, with information regarding these resources; and to compile and publish directories and other listings of scientific and technical information resources. A nonbibliographic information service which in some respects parallels the National Referral Center is the Smithsonian Science Information Exchange (SIE). SIE is a clearinghouse for information on current scientific research actually in progress. SIE annually collects 85,000 to 100,000 single page records of current research projects, both of the government and the private sector. (See also W74-03040) (Knapp-USGS)
W74-03047

INTRODUCTION TO LEGAL, LEGISLATIVE AND REGULATORY SESSION OF NATIONAL ENVIRONMENTAL PROTECTION SYMPOSIUM,
Library of Congress, Washington, D.C.
L. C. Hamilton.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 279-284, May 1973.

Descriptors: *Information exchange, *Legal aspects, Libraries, Data collections, Information retrieval, Indexing, Regulation, Legislation, Bibliographies, Publications, Water law.
Identifiers: *Library of Congress.

A brief description is given of the development of information centers in the United States. How legal information is produced and used in the Library of Congress is described. Within the Library of Congress itself, information processing is divided into two major categories: the activities which support the Congress directly or indirectly through the Congressional Research Service; and the activities which involve the processing, dissemination, and retrival of bibliographic information. (See also W74-03040) (Knapp-USGS)
W74-03048

ENVIRONMENTAL LAW INFORMATION SYSTEM,
Aspen Systems Corp., Colo.
L. H. Berul.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 285-310, May 1973. Append.

Descriptors: *Information exchange, *Legal aspects, Libraries, Data collections, Information retrieval, Indexing, Regulation, Legislation, Bibliographies, Publications, Water law.

An environmental law information center should include legal, legislative, and regulatory information. The system can provide searches of existing statutes in many states, can provide tracking of recently enacted and pending legislation, and can provide specialized subfiles in machine readable form on such topics as air pollution, water pollution or any other subject. (See also W74-03040) (Knapp-USGS)
W74-03049

LEGAL BIBLIOGRAPHY: A CRITICAL OVERVIEW,
Utah Univ., Salt Lake City. Coll. of Law.
For primary bibliographic entry see Field 10C.
W74-03050

DOCUMENT SERVICES AND REFERRAL ACTIVITIES IN THE LEGAL, LEGISLATIVE, AND REGULATORY AREA,
Congressional Information Service, Washington, D.C.
J. B. Adler.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 331-339, May 1973.

Descriptors: *Information exchange, *Legal aspect, Libraries, Data collections, Information retrieval, Indexing, Regulation, Legislation, Bibliographies, Publications, Water law.

Legislative and regulatory activity in the environmental area has grown to the point where a majority of congressional committees and federal agencies are now creating documents with significance for environmental research. The availability of these documents is discussed. Bibliographic and referral services are listed and described. The government has for many years been the world's largest printer and the world's least effective publisher. As a result, the kinds of bibliographic tools used for research in the commercial publishing area and in the scientific publishing area have traditionally not existed in the government publishing area. (See also W74-03040) (Knapp-USGS)
W74-03051

DOCUMENT SERVICES AND REFERRAL ACTIVITIES IN INDUSTRY AND THE FEDERAL GOVERNMENT,
Computer Sciences Corp., Washington, D.C.
A. S. Jenkins.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 391-399, May 1973.

Descriptors: *Information exchange, Bibliographies, Publications, Data storage and retrieval, Data collections, Documentation, Indexing, Information retrieval, Environment, Ecology.

Some of the document services and referral activities available in industry and the Federal government are described. The National Referral Center, Science and Technology Division, Library of Congress, is concerned with all fields of science and technology--the physical, biological, social, and engineering sciences--and the many technical areas resources in government, industry, and the academic and professional world. Other Federal and industry referral activities are available, but none has the scope of the National Referral Center. The Department of Commerce's National Technical Information Service (NTIS) is the central source for the public sale of Government sponsored research and development reports and other analyses prepared by Federal agencies and their contractors and grantees. This includes those Department of Defense documents which do not carry a security classification. The Government Printing Office also is a source of documents generated by Federal agencies. There are other Federal level document services available. The best way to find information is to work through the National Referral Center and the National Technical Information Service. Document services are also available from most professional societies. (See also W74-03045) (Knapp-USGS)
W74-03052

MINNESOTA NATURAL RESOURCE INFORMATION SYSTEM,
Minnesota State Planning Agency, St. Paul. Environmental Quality Planning.
J. E. Sizer.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 400-410, May 1973. 1 fig, 1 tab.

Descriptors: *Data storage and retrieval, *Land use, *Minnesota, Data collections, Information exchange, Planning, Information retrieval.

The Minnesota Land Management Information System is the basic resource management information system for the State. The land use information was obtained through interpretation of high altitude aerial photography. The State Land Use Information System has 1,365,000 forty-acre units (or Government lots) and each has a computer punchcard containing the following information: parcel location, current land use, water orientation, and latitude and longitude of cities. Other data to be included are: dominant soil type, minerals data, industrial development, recreation development, public controls, surface ownership, geologic data, slope, surface water data, and groundwater data. (See also W74-03040) (Knapp-USGS)
W74-03053

10C. Secondary Publication And Distribution

THE MOVEMENT AND IMPACT OF PESTICIDES USED FOR VECTOR CONTROL ON THE AQUATIC ENVIRONMENT IN THE NORTHEASTERN UNITED STATES,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05B.
W74-02948

TECHNICAL AND SCIENTIFIC JOURNALS,
Pollution Abstracts, Inc., La Jolla, Calif.
B. C. Rosenthal.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 186-225, May 1973. Append.

Descriptors: *Abstracts, *Information exchange, Publications, Documentation, Bibliographies, Libraries, Environment, Ecology, Water resources, Information retrieval, Indexing.
Identifiers: Secondary publications.

The secondary publication is the link between a user's specific or unrefined information need and the thousands of primary information options he confronts. General examples of secondary publications are reviewed. The secondary publication has significant value to the user. It alerts the user to the availability of the vast number of primary source documents; exposes this information to the user without requiring the purchase of original source documents; lets the user's rationale determine the importance of the primary material; allows the user to track specialized topics, publications, and authors; and keeps the user alert to changes in the state-of-the-art of special interest subjects. (See also W74-03040) (Knapp-USGS)
W74-03045

DOCUMENT SERVICES,
National Technical Information Service, Springfield, Va.
W. T. Knox.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 226-242, May 1973.

Descriptors: *Abstracts, *Information exchange, Publications, Documentation, Bibliographies, Libraries, Environment, Ecology, Water resources, Information retrival, Indexing.
Identifiers: *National Technical Information Service.

A brief introduction to the document services available in the United States is given. People seeking documents from Federal agencies have two general methods to obtain them:receiving the documents as they are initially published by the agency (so-called initial distribution), and getting the documents from a secondary distributor. The Superintendent of Documents, the National Technical Information Service, and the Library of Congress are the major Federal secondary sources from which the public may purchase document services. The National Technical Information Service and its predecessor organizations have been providing document services since 1945. It is probably the world's largest specialty publisher. All of the NTIS collection of 700,000 different documents, dating back to about 1950, are available for sale. 'NTISearch', a relatively new NTIS service, provides a comprehensive search of the total NTIS collection in answer to specific questions. The Library of Congress also provides document services. In addition, most Federal departments and agencies have their own libraries, or information centers. These libraries contain copies of the agencies' documents along with other publications of interest to the mission of the agency. (See also W74-03040) (Knapp-USGS)
W74-03046

REFERRAL ACTIVITIES AND OTHER NON-BIBLIOGRAPHIC INFORMATION SERVICES,
Library of Congress, Washington, D.C. Science and Technology Div.
For primary bibliographic entry see Field 10B.
W74-03047

LEGAL BIBLIOGRAPHY: A CRITICAL OVERVIEW,
Utah Univ., Salt Lake City. Coll. of Law.
G. S. Grossman.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 311-330, May 1973. 12 ref.

Descriptors: *Information exchange, *Legal aspects, Libraries, Data collections, Information retrieval, Indexing, Regulation, Legislation, Bibliographies, Publications, Water law.

In law, professional influence on the shaping of the bibliographic system is imperceptible; the communication from users of reference tools to publishers is practically nonexistent; no legal professional association today is engaged in the ascertainment of lawyers' information needs or in the effort to shape legal research tools to meet those needs. To improve this situation, a commitment of professional manpower to the bibliographic control process is essential. The expertise of those who use the information is needed at every stage: to develop the nomenclature governing the input of information; to decide what the data base should be; to develop interest profiles of users so that the system may be responsive; to decide what time factors may be reasonable in the delay of information; and to translate user questions into the language of the system. The bibliographic tools available in the field of environmental law are listed and described. Access to them is better through environmental sources than through legal sources. In Environmental Law, there are two major looseleaf services, the Environment Reporter of the Bureau of National Affairs and the Environmental Law Reporter of the Environmental Law Institute. (See also W74-03040) (Knapp-USGS)
W74-03050

COOPERATIVE INVESTIGATION OF THE CARIBBEAN AND ADJACENT REGIONS (CICAR), VOLUME II, BIBLIOGRAPHY ON MARINE BIOLOGY.
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 02L.
W74-03054

COOPERATIVE INVESTIGATION OF THE CARIBBEAN AND ADJACENT REGIONS (CICAR), VOLUME III, BIBLIOGRAPHY ON MARINE GEOLOGY AND GEOPHYSICS.
Franklin Inst. Research Labs., Philadelphia, Pa.
For primary bibliographic entry see Field 02L.
W74-03055

COMPUTER SIMULATION OF SHALLOW--WATER MARINE SEDIMENTATION,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-03109

10D. Specialized Information Center Services

NATIONAL ENVIRONMENTAL INFORMATION SYMPOSIUM: AN AGENDA FOR PROGRESS--PAPERS AND REPORTS, VOLUME 2.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 10B.
W74-03040

A SURVEY OF THE BIOLOGICAL-SCIENCE--RELATED INFORMATION CENTERS LISTED IN THE SEQUIP REPORT,
Oak Ridge National Lab., Tenn.
W. B. Cottrell.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 93-111, May 1973. 4 tab, 6 ref, 2 append. AEC Contract W-7405-Eng.-26.

Descriptors: *Information exchange, Bibliographies, Publications, Data storage and retrieval, Data collections, Documentation, Indexing, Information retrieval, Environment, Ecology.
Identifiers: *Information centers.

Information centers concerned with the biological sciences were reviewed by using two surveys. One survey identified the information provided by the center, those benefited from the information, and from what resources it was obtained. The second survey consisted of an individualized inquiry sent to each center in order to evaluate its response. Not all information programs are technical information centers constituted to provide information outside the sponsoring agency. If the inquiry is directed to the appropriate center and the communication link is such that there is good understanding by both parties involved, a wealth of valuable information, opinions, and insights may be readily assembled. Preparation of reports is a common characteristic of all information centers, as are such other services as preparing bibliographies, answering inquiries, and providing consultation. Other information outlets such as periodic publications, are much less common. The services of a majority of the centers are available to all, although an individual is somewhat less likely (61%) to be served than either a university or private industry (77%), both of which are second to government contractors (85%). (See also W74-03040) (Knapp-USGS)
W74-03041

INFORMATION CENTERS CONCERNED WITH ENVIRONMENTAL MATTERS: PHYSICAL SCIENCE AND TECHNOLOGY,
National Bureau of Standards, Washington, D.C.
E. L. Brady.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 112-125, May 1973.

Descriptors: *Information exchange, Bibliographies, Publications, Data storage and retrieval, Data collections, Documentation, Indexing, Information retrieval, Environment, Ecology.
Identifiers: *Information centers.

An information center is an organized group that collects documents and other recorded information in a specified field of knowledge, selects, and stores appropriate portions of the collected information to provide a variety of services to people who may need it. These services may be abstracts, bibliographies, data compilations, critical reviews, recommendations on new research, or any other output derived from the stored information. Some of the centers providing information services in the physical sciences are described with concentration on those centers that obtain most of their information from documents and other written records. (See also W74-03040) (Knapp-USGS)
W74-03042

FEDERAL ENVIRONMENTAL DATA CENTERS AND SYSTEMS,
National Oceanographic Data Center, Washington, D.C.
A. R. Hull.
In: National Environmental Information Symposium: An Agenda for Progress, Vol 2, Papers and Reports; Environmental Protection Agency Publication, p 128-169, May 1973. 3 append.

Descriptors: *Information exchange, Bibliographies, Publications, Data storage and retrieval, Data collections, Documentation, Indexing, Information retrieval, Environment, Ecology.
Identifiers: *Information centers.

Eventually, many environmental data, whether collected in the ocean's depths, outer space, or a country field, wind up in one of the Federal Government's environmental data centers or systems, where they are generally available to all. To facilitate the movement of data between agencies and individuals working in the fields of water resources evaluation, development, and management, the Geological Survey established a National Water Data Exchange (NAWDEX). Photographic products acquired by NASA from surface, airborne, or spaceborne platforms for research and experimental use in NASA's Earth Resources Survey Program are available for purchase. NOAA provides earth resources data to its user publics through the Environmental Data Service's National Climatic Center (NCC), while USDA's user interface is the Western Aerial Photography Laboratory in Salt Lake City. STORET is the central, computer oriented repository for all water quality control data collected by EPA and cooperating agencies. EPA's National Air Data Branch is charged with the collection, validation, analysis, and publication of (a) air quality data in the SAROAD (Storage and Retrieval of Aerometric Data) system, and (B) emissions data in the NEDS (National Emission Data System) system. NOAA's Environmental Data Service (EDS) operated 3 environmental data centers: the National Climatic Center (NCC), the National Oceanographic Data Center (NODC), and the National Geophysical and Solar-Terrestrial Data Center (NGSDC). (See also W74-03040) (Knapp-USGS)
W74-03043

10F. Preparation of Reviews

HYDRODYNAMICS OF ARTIFICIAL GROUNDWATER RECHARGE (SATURATED FLOW THEORY),
California Univ., Irvine. School of Engineering.
For primary bibliographic entry see Field 04B.
W74-03091

SUBJECT INDEX

ABATEMENT
Disposal of Waste Materials at Sea.
W74-02819 6E

ABLATION
Ablation Characteristics of an Alpine Snow Field in Summer,
W74-02653 2C

ABRASION
Fragmentation of Granitic Quartz in Water,
W74-03065 2J

ABSTRACTS
Technical and Scientific Journals,
W74-03045 10C

Document Services,
W74-03046 10C

Referral Activities and Other Non-Bibliographic Information Services,
W74-03047 10B

ACCOMACK COUNTY (VA)
Chincoteague Inlet, Navigation Project, Accomack County, Virginia (Final Environmental Statement).
W74-02800 8A

ACID-BASE EQUILIBRIUM
Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

ACIDITY
Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

ACINETOBACTER
The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

ACOUSTICS
Ultrasonic Emissions in Snow,
W74-02741 2C

ACTIVATED CARBON
Granular to Powdered Activated Carbon in Polluted Water Purification Process,
W74-03019 5D

ACTIVATED SLUDGE
Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

Granular to Powdered Activated Carbon in Polluted Water Purification Process,
W74-03019 5D

Characterization of Sulfite Pulp Bleaching Effluents and Their Behavior During Biodegradation (Abwassertechnische Charakterisierung von Sulfitzellstoffbleicherei-Abwassern und deren Verhalten beim biologischen Abbau),
W74-03073 5D

ADAPTATION
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

ADMINISTRATION
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

Implementation of the Federal Water Pollution Control Act.
W74-02782 6E

A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

Need to Improve Administration of the Water Pollution Research, Development, and Demonstration Program.
W74-03131 5G

Problems and Instruments Relating to the Allocation of Environmental Costs.
W74-03198 6B

ADMINISTRATIVE AGENCIES
Rural Water Districts.
W74-02813 6E

ADMINISTRATIVE REGULATIONS
Disposal of Waste Materials at Sea.
W74-02819 6E

ADSORPTION
The Adsorption of Rhodamine-B on to Materials Carried in Suspension by Inshore Waters,
W74-02721 5B

Oil Removal from Waste Waters,
W74-03020 5D

ADVECTION
Diffusion,
W74-03030 5B

AERATION
Bottom Fauna Changes During Artificial Reservoir Destratification,
W74-02992 5C

Sewage Treatment Vessel,
W74-03016 5D

Granular to Powdered Activated Carbon in Polluted Water Purification Process,
W74-03019 5D

Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

AERATORS
Surface Aerator Having Wave Attenuator,
W74-03018 5D

AERIAL PHOTOGRAPHY
Coastal Imagery Data Bank: Interim Report,
W74-02701 2L

AEROBIC SEWAGE DISPOSAL UNITS
Individual Home Aerobic Wastewater Treatment Systems,
W74-02668 5D

AESTHETICS
Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

AGRICULTURAL RUNOFF
EPA Readies Farm Antipollution Guidelines.
W74-03128 5D

AGRICULTURE
Implications of Selected National Water Commission Recommendations to Agricultural Policy,
W74-03181 6B

Water Resources Policy Issues Related to Agriculture,
W74-03182 6B

Wells and Welfare. An Exploratory Cost-Benefit Study of the Economics of Small-Scale Irrigation in Maharashtra,
W74-03192 6B

AIR CONDITIONING
Power Plant Effluent - Thermal Pollution or Energy at a Bargain Price,
W74-02888 5B

AIR POLLUTION
Thermolytic Sewage System,
W74-03001 5D

AIR-WATER INTERFACES
Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

ALABAMA
Permit Application by Radcliff Materials, Inc.--Dredging of Dead-Reef Shells, Mobile Bay, Alabama (Final Environmental Statement). 21Available NTIS, Springfield, Va. 22151 as EIS-AL-73-0542-F, Price $12.00 printed copy. February 1973. 187 p, 44 ref.
W74-02737 6G

Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

ALABAMA-TOMBIGBEE RIVERS REGION
Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

ALASKA
Trace Metals in a Tundra Pond: Variations in Concentration and Their Effect on Phytoplankton Populations,
W74-02726 2H

The Influence of Dissolved Humic Substances on Trace Metal Phototoxicity,
W74-02727 2H

ALBANY (NY)
Managing our Coastal Zone.
W74-03037 5G

ALGAE
Contribution to Knowledge about the Algae (Excluding Bacillariophyceae) of Stagnant Waters of the Iron Gates of the Danube,
W74-02699 5C

Associated Organelles in the Blue-Green Alga, Anacystis Nidulans,
W74-02927 5C

ALGAL TOXINS
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

ALLUVIAL CHANNELS
Minimization of Power Expenditure in a Riffle-Pool Alluvial Channel,
W74-02768 2J

ALLUVIUM
Fragmentation of Granitic Quartz in Water,
W74-03065 2J

ALTERNATIVE PLANNING
Multigoal Water Quality Planning Model,
W74-02678 5B

Value Comparisons in Free-Flowing Stream Development,
W74-03190 6B

ALUM TREATMENT
The Full-Scale Refinement of Purified Sewage for Unrestricted Industrial use in the Manufacture of Fully Bleached Kraft-Pulp and Fine Paper,
W74-02906 5D

AMMONIA
Water Quality Criteria for European Freshwater Fish. Reoprt on Ammonia and Inland Fisheries.
W74-02951 5C

ANADARA-SUBCRENATA
An Ecological Study on the So-Called Mogai (Anadara subcrenata (Lischke)) Cultured in the Kasaoka Bay (In Japanese),
W74-02690 5C

ANALOG-TO-DIGITAL CONVERSION
On-Line Signal Digitizing for Computer Input,
W74-02950 7C

ANALYTICAL TECHNIQUES
Instrumental Analysis of Chemical Pollutants--Training Manual.
W74-02739 5A

Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

ANILINIUM IONS
Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

ANIMAL POPULATIONS
Small Mammals Increase on Recently Cleared and Seeded Juniper Rangeland,
W74-02938 4A

ANISOTROPIC RESERVOIRS
Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

ANISOTROPY
Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

ANKISTRODESMUS BRAUNII
The Appearance of Nitrate Reductase Activity in Nitrogen-Starved Cells of Ankistrodesmus Braunii,
W74-02929 5C

ANNUAL
Construction of a Map of Average Annual Runoff for North Kazakhstan (Postroyeniye karty normy stoka Severnogo Kazakhstana),
W74-02751 2E

Investigation of Correlation of Annual Runoff for Appalachian Rivers (Issledovaniye korrelyativnoy svyazi godovogo stoka Appalachskikh rek),
W74-02752 2E

ANNULUS PRESSURE LOSS
Easier, More Exact Method Speeds Annulus Pressure-Loss Calculations,
W74-03162 8G

ANTIBIOTIC DILUTION TESTS
Microdilution Antibiotic Susceptibility Test: Examination of Certain Variables,
W74-02968 5A

ANTIBIOTICS (PESTICIDES)
Microdilution Antibiotic Susceptibility Test: Examination of Certain Variables,
W74-02968 5A

APPALACHIAN MOUNTAIN REGION
Investigation of Correlation of Annual Runoff for Appalachian Rivers (Issledovaniye korrelyativnoy svyazi godovogo stoka Appalachskikh rek),
W74-02752 2E

APPLICATION METHODS
Loss of Nitrogen from Various Nitrogen Fertilizers on Irrigated Land,
W74-02936 3F

APPRAISALS
Eagle Nest Lake: Revised Appraisal.
W74-03188 6B

AQUATIC ALGAE
On the Systematics and Ecology of the Genus Chamesiphon (Cyanophyceae). 2. Ecology (Zur Systematik und Okologie det Gattung Chamesiphon (Cyanophyceae) 2. Okologie),
W74-02952 5C

Method for the Selective Enumeration of Blue-Green Bacteria in Water,
W74-02974 5A

AQUATIC ANIMALS
Littoral Fauna Along the NW Coast of the Sea of Japan,
W74-02691 2L

The Cooling Water of Power Stations: A New Factor in the Environment of Marine and Fresh-Water Invertebrates,
W74-02879 5C

AQUATIC BACTERIA
Method for the Selective Enumeration of Blue-Green Bacteria in Water,
W74-02974 5A

Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

AQUATIC ENVIRONMENT
Final Environmental Impact Statement for Modification of a Boat Dock and Ramp.
W74-03124 6G

AQUATIC HABITATS
Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

AQUATIC INSECTS
Observations on Upstream Migration by Imagines of Some Plecoptera and Ephemeroptera,
W74-02967 5B

AQUATIC LIFE
Water Use for Aquatic Life,
W74-02865 5C

AQUATIC MICROORGANISMS
Growth of an Adherent Mixed Microbial Culture in a Substrate Limited Single State Chemostat,
W74-02661 5C

An Annual Plankton Cycle on the Chesapeake Bay in the Vicinity of Calvert Cliffs, Maryland, June 1969 - May, 1970,
W74-02863 5C

AQUATIC ORGANISMS
Observations on the Response of Some Benthonic Organisms to Power Station Cooling Water,
W74-02881 5C

Effect on Organisms of Entrainment in Cooling Water: Steps Toward Predictability,
W74-02894 5C

AQUATIC PLANTS
Littoral Fauna Along the NW Coast of the Sea of Japan,
W74-02691 2L

AQUATIC POPULATIONS
Bottom Fauna Changes During Artificial Reservoir Destratification,
W74-02992 5C

Statistical Analysis of Biological Data from Preoperational-Postoperational Industrial Water Quality Monitoring,
W74-02993 5A

AQUATIC WEED CONTROL
Burning as a Supporting Treatment in Controlling Waterhyacinth in the Sudan. Part I. Routine Burning,
W74-02918 4A

Burning as a Supporting Management in the Control of Waterhyacinth in the Sudan. Part II. Backburning,
W74-02919 4A

AQUATIC WEEDS
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

AQUEOUS SOLUTIONS
Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

AQUIFER
Groundwater Movement,
W74-03142 4B

AQUIFER CHARACTERISTICS
Ground Water in Thailand,
W74-03150 4B

Planning and Analysis of Pulse-Tests,
W74-03164 2F

AQUIFER SYSTEMS
Drawdown Distribution Due to Well Fields in Coupled in Coupled Leaky Aquifers, 1. Infinite Aquifer System,
W74-02773 2F

AQUIFERS
Stimulation Modes of Geothermal Aquifers,
W74-02876 4B

Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

ARAGONITE
Incorporation of Uranium in Modern Corals,
W74-03064 2K

ARCADIAN WILDLIFE SANCTUARY (MASS.)
Partial Recovery of a Vegetation in a Pollution Damaged Marsh,
W74-02663 5C

ARCH DAMS
Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

ARCTIC
Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

Electrochemical Measurement of Zinc in Organic-Rich Water,
W74-02729 2H

ARIZONA
Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

ARKANSAS RIVER (OKLA)
The Identification and Measurement of Chlorinated Hydrocarbon Pesticides Accumulated From Urban Runoff,
W74-02665 5A

ARTESIAN AQUIFERS
Drawdown Distribution Due to Well Fields in Coupled in Coupled Leaky Aquifers, 1. Infinite Aquifer System,
W74-02773 2F

ARTIFICIAL RECHARGE
Flow Characteristics of a Subsurface-Controlled Recharge Basin on Long Island, New York,
W74-02734 4B

Hydrodynamics of Artificial Groundwater Recharge (Saturated Flow Theory),
W74-03091 4B

ASIA
Pa Mong Stage one Feasibility Report. Appendix VI. Economic, Agricultural, Social and Financial Analysis.
W74-02686 6B

Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

ASPHALT
Determination of Furfural in Water and Asphalt (In Polish),
W74-02798 5A

ASSESSMENTS
A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

ATLANTIC OCEAN
Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

Incidence of Vibrio parahaemolyticus in Shellfish from Eight Canadian Atlantic Sampling Areas,
W74-03185 5A

ATMOSPHERE
Atmospheric Reaeration Capacity of Streams. Part I. Critical Review of Methods Available to Measure and to Calculate the Atmospheric Reaeration Rate Constant,
W74-02916 5C

Atmospheric Reaeration Capacity of Streams. Part II. Direct Measurement of the Atmospheric Reaeration Rate Constant in the Upper Raritan River Basin,
W74-02917 5C

ATMOSPHERIC PRESSURE
Computing the Barometric Efficiency of a Well,
W74-03167 8B

ATOMIC ABSORPTION ANALYSIS
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

ATTITUDES
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

AUSTRALIA
A Preliminary Investigation of the Recent Sediments Off the East Coast of Australia,
W74-02714 2J

Hydrography and Water Resources of Australia (Gidrografiya i vodnyye resursy Avstralii),
W74-02757 6B

Studies on a Saline Lake Ecosystem,
W74-02920 5C

The Seasonal Growth of Lovegrass (Eragrostis Curvula) on Deep Sandy Soils In A Semi-Arid Environment,
W74-02942 3F

AUTOMATIC CONTROL
The Denver System of Controls,
W74-02854 5F

Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

AVALANCHE CONTROL
Controlled Release of Avalanches by Explosives,
W74-02746 2C

AVALANCHES
Advances in North American Avalanche Technology: 1972 Symposium.
W74-02740 2C

Ultrasonic Emissions in Snow,
W74-02741 2C

Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

Material Property and Boundary Condition Effects on Stresses in Avalanche Snowpacks,
W74-02743 2C

On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

Statistical Problems in Snow Mechanics,
W74-02745 2C

Controlled Release of Avalanches by Explosives,
W74-02746 2C

Observations of Avalanche Impact Pressures,
W74-02747 2C

AVENA-FATUA
Investigation on the Ecology and Control of Wild Oat (Avena fatua L.) Under the Conditions in Wroclaw Voivodeship, (In Polish),
W74-02921 3F

AVERAGE RUNOFF
Construction of a Map of Average Annual Runoff for North Kazakhstan (Postroyeniye karty normy stoka Severnogo Kazakhstana),
W74-02751 2E

BACILLARIOPHYCEAE
Contribution to Knowledge about the Algae (Excluding Bacillariophyceae) of Stagnant Waters of the Iron Gates of the Danube,
W74-02699 5C

BACILLUS SUBTILIS
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

BACTERIA
Growth of an Adherent Mixed Microbial Culture in a Substrate Limited Single State Chemostat,
W74-02661 5C

Some Aspects of Chemical Control of Soil-Borne Pathogens,
W74-02889 5B

BACTERIA

The Occurrence of Heterotrophic Bacteria in the Waters of the Ilawa Lakes and Some of Their Physiological and Biochemical Properties,
W74-02931 5C

A Portable Apparatus for Measuring Relative Gas Vacuolation, The Strength of Gas Vacuoles, and Turgor Pressure in Planktonic Blue-Green Algae and Bacteria,
W74-02976 5A

The Observation of Micro-Organisms on Surfaces by Incident Fluorescence Microscopy,
W74-02989 5A

BACTERIAL POPULATIONS

Electron Microscopic Investigation of Natural Bacterial Populations in the Water and Sediment of Lake Balaton and Lake Belso,
W74-02725 5A

BAFFLES

Surface Aerator Having Wave Attenuator,
W74-03018 5D

BANK EROSION

A Bill to Authorize the Secretary of the Army to Investigate, Plan, and Construct Projects for the Control of Streambank Erosion.
W74-02789 6E

Southern Mutual Investment Corporation V. Langston (Suit for Damages Resulting from Diversion of Surface Waters).
W74-02807 6E

BANK PROTECTION

A Bill to Authorize the Secretary of the Army to Investigate, Plan, and Construct Projects for the Control of Streambank Erosion.
W74-02789 6E

BAROMETRIC EFFICIENCY

Computing the Barometric Efficiency of a Well,
W74-03167 8B

BARRIERS

Sand Budget for Capitola Beach, California,
W74-02718 8B

BARROW (ALASKA)

Trace Metals in a Tundra Pond: Variations in Concentration and Their Effect on Phytoplankton Populations,
W74-02726 2H

BASE FLOW

Forest Transpiration Greatly Speeds Streamflow Recession,
W74-02766 2D

BASELINE STUDIES

Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

BAYESIAN APPROACH

Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

BAYS

Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

Partitioning of the Estuarine Environment by Two Species of Cancer,
W74-02717 2L

Permit Application by Radcliff Materials, Inc.--Dredging of Dead-Reef Shells, Mobile Bay, Alabama (Final Environmental Statement). 21Available NTIS, Springfield, Va. 22151 as EIS-AL-73-0542-F, Price $12.00 printed copy. February 1973. 187 p, 44 ref.
W74-02737 6G

Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

Research in the Coastal and Oceanic Environment,
W74-03096 2J

First Experimental Results on the Diffusion of Fresh Water in a shallow bay,
W74-03100 2L

Equilibrium Shapes of Coastline in Plan,
W74-03105 2J

BEACH EROSION

A Function for Sand Movement by Wind,
W74-02689 2J

Observations on Floating Breakwaters for Reflection of Shallow Water Waves (Recherches Sur Les Brise-Lames Flottants Destines A Reflechir La Houle En Eau Peu Profonde),
W74-02693 2J

Sand Budget for Capitola Beach, California,
W74-02718 8B

The Great Atlantic Coast Tides of 5-8 March 1962,
W74-03099 2J

Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2J

BEACHES

An Investigation of the Deformation and Breaking of Solitary Waves,
W74-02694 2E

The Southern Monterey Bay Littoral Cell: A Preliminary Sediment Budget Study,
W74-02695 2L

Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

Energy Measurements in the Swash-Surf Zone,
W74-02702 2E

Deformation of Temporal Pattern of Orbital Wave Velocity and Sediment Transport in Shoaling Water, In Breaker Zone and on Foreshore,
W74-02711 2L

Breaker Type Classification on Three Laboratory Beaches,
W74-02712 2E

Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2J

Quantitative Studies of Beach Morphology and Beach Forming Processes,
W74-03104 2J

Feasibility of Modeling Run-up Effects of Dispersive Water Waves,
W74-03106 8B

Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

Wave Runup, Mono Lake Tests, 1965: A Summary of Theoretical Prediction Methods and Some Comparisons with Experimental Data,
W74-03113 2H

The Ocean Edge of San Diego,
W74-03120 6D

BED LOAD

Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

BENEFITS

Value Comparisons in Free-Flowing Stream Development,
W74-03190 6B

BENTHIC FAUNA

Observations on the Response of Some Benthonic Organisms to Power Station Cooling Water,
W74-02881 5C

Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

Bottom Fauna Changes During Artificial Reservoir Destratification,
W74-02992 5C

BENTHOS

A Microbenthos Study of Rotatoria,
W74-02893 2H

Acton Lake: Biology of Its Benthos and Notes on Its Physical Limnology 1959-1970,
W74-03066 2H

BENTONITE

The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

BERING SEA

Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

BERMS

The Effects of Water Table and Tide Cycle on Swash-Backwash Sediment Distribution and Beach Profile Development,
W74-02716 2J

BIBLIOGRAPHIES

Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume II, Bibliography on Marine Biology.
W74-03054 2L

Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume III, Bibliography on Marine Geology and Geophysics.
W74-03055 2L

Hydrodynamics of Artificial Groundwater Recharge (Saturated Flow Theory),
W74-03091 4B

BIGMOUTH BUFFALO FISH
Population Studies of Bigmouth Buffalo in Coralville Reservoir with Special Reference to Commercial Harvest,
W74-03036 8I

BIOACCUMULATION
Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

BIOASSAY
Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

Respiration Rates of Some New Zealand Echinoderms (Note),
W74-02949 5A

The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

Biological Surveys: Intent, Methodology, Interpretation,
W74-03086 5C

BIOASSAYS
Variation in Results of Identical Bioassays of Minnows Subjected to Instant Temperature Increase,
W74-02898 5C

BIOCHEMICAL CHARACTERISTICS
Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

BIOCHEMICAL OXYGEN DEMAND
The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

BIOCHEMISTRY
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

Associated Organelles in the Blue-Green Alga, Anacystis Nidulans,
W74-02927 5C

Effect of Nitrite and Nitrate on Chlorophyll Fluorescence in Green Algae,
W74-02928 5C

The Occurrence of Heterotrophic Bacteria in the Waters of the Ilawa Lakes and Some of Their Physiological and Biochemical Properties,
W74-02931 5C

BIODEGRADATION
The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

Decomposition of Marine Copepods,
W74-02973 5A

Characterization of Sulfite Pulp Bleaching Effluents and Their Behavior During Biodegradation (Abwassertechnische Charakterisierung von Sulfitzellstoffbleicherei-Abwassern und deren Verhalten beim biologischen Abbau),
W74-03073 5D

Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

BIOLOGICAL COMMUNITIES
The Realities of Thermal Pollution - Environmental Limitations and Ecological Adaptations,
W74-02870 5C

Studies on a Saline Lake Ecosystem,
W74-02920 5C

BIOLOGICAL MAGNIFICATION
Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

BIOLOGICAL TREATMENT
Design Optimization for Biological Filter Models,
W74-02679 5D

Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

Characterization of Sulfite Pulp Bleaching Effluents and Their Behavior During Biodegradation (Abwassertechnische Charakterisierung von Sulfitzellstoffbleicherei-Abwassern und deren Verhalten beim biologischen Abbau),
W74-03073 5D

BIOMASS
An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

BIORHYTHMS
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

BIOSYNTHESIS
Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

BITS
The Role of Rock Strength Anisotropy in Natural Hole Deviation,
W74-03156 8B

BLASTING
Controlled Release of Avalanches by Explosives,
W74-02746 2C

BLEACHING WASTES
Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

Characterization of Sulfite Pulp Bleaching Effluents and Their Behavior During Biodegradation (Abwassertechnische Charakterisierung von Sulfitzellstoffbleicherei-Abwassern und deren Verhalten beim biologischen Abbau),
W74-03073 5D

Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

BOSTON METROPOLITAN AREA
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

BOTTOM SEDIMENTS
A Preliminary Investigation of the Recent Sediments Off the East Coast of Australia,
W74-02714 2J

On the Water Quality of Lake Biwa, The Seta River and some Rivers in Otsu City and the Heavy Metal Content of Bottom Matters of Lake Biwa, (In Japanese),
W74-02935 5B

Mud in the North Sea,
W74-03031 2J

Sediment Distribution in the North Sea in Relation to Marine Pollution,
W74-03033 5B

BOTTOM SLOPE
Water Wave Run-Up on a Beach,
W74-02698 2E

BOULDER (COLORADO)
Boulder Creek Flood Control Project--An Environmental Status Report,
W74-02859 6F

BOUNDARY DISPUTE
Red Hook Marina Corporation V. Antilles Yachting Corporation (Action to Recover Unpaid Balance on Note and to Foreclose Purchase Money Mortgage).
W74-02811 6E

BRACKISH WATER
Lower Fungi as Test Organisms of Pollutants in Sea and Brackish Water: The Effects of Heavy Metal Compounds and Phenol on Thraustochytrium striatum (In German),
W74-02696 5C

BREAKER ZONE
Deformation of Temporal Pattern of Orbital Wave Velocity and Sediment Transport in Shoaling Water, In Breaker Zone and on Foreshore,
W74-02711 2L

BREAKERS
An Investigation of the Deformation and Breaking of Solitary Waves,
W74-02694 2E

Breaker Type Classification on Three Laboratory Beaches,
W74-02712 2E

Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

BREAKING WAVES
The Great Atlantic Coast Tides of 5-8 March 1962,
W74-03099 2J

BREAKWATERS
Observations on Floating Breakwaters for Reflection of Shallow Water Waves (Recherches Sur Les Brise-Lames Flottants Destines A Reflechir La Houle En Eau Peu Profonde),
W74-02693 2J

BRINES
Disposal of Brine into An Estuary,
W74-02735 5B

BRITTLE FAILURE
Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

BROOK TROUT
Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

BROOM SNAKEWEED
Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

BROWN TROUT
Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

BUCKLING
On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

BURNING
Burning as a Supporting Treatment in Controlling Waterhyacinth in the Sudan. Part I. Routine Burning,
W74-02918 4A

Burning as a Supporting Management in the Control of Waterhyacinth in the Sudan. Part II. Backburning,
W74-02919 4A

Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

BURST LOAD
'Maximum Load' Casing Design,
W74-03157 8B

CALANUS FINMARCHICUS
Decomposition of Marine Copepods,
W74-02973 5A

CALCIUM CARBONATE
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

CALIFORNIA
Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

The Southern Monterey Bay Littoral Cell: A Preliminary Sediment Budget Study,
W74-02695 2L

Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

The Effects of Water Table and Tide Cycle on Swash-Backwash Sediment Distribution and Beach Profile Development,
W74-02716 2J

Sand Budget for Capitola Beach, California,
W74-02718 8B

Geochronological Studies in Santa Barbara Basin: Fe-55 as a Unique Tracer for Particulate Settling,
W74-02722 2J

Snow Survey Measurements Through 1970,
W74-02738 2C

Baylands Salt Water Flood Control Planning Study.
W74-02829 4A

San Diego's Offshore Area,
W74-02831 6F

The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

The California State Water Project Summary: Nineteen-Seventy-Two, Appendix C.
W74-03026 4A

Weather Modification Operations in California, October 1, 1968 - September 30, 1969,
W74-03056 3B

Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

Wave Runup, Mono Lake Tests, 1965: A Summary of Theoretical Prediction Methods and Some Comparisons with Experimental Data,
W74-03113 2H

A Study of Water Circulation in Monterey Harbor Using Rhodamine B Dye,
W74-03114 2L

The Ocean Edge of San Diego,
W74-03120 6D

Water, Land, and Environment Imperial Valley: Law Caought Up in the Winds of Politics,
W74-03127 6E

CALIFORNIA STATE WATER PROJECT (1972)
The California State Water Project Summary: Nineteen-Seventy-Two, Appendix C.
W74-03026 4A

CALLIOPIUS LAEVIUSCULUS
Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

CALVERT CLIFFS POWERPLANT
An Annual Plankton Cycle on the Chesapeake Bay in the Vicinity of Calvert Cliffs, Maryland, June 1969 - May, 1970,
W74-02863 5C

CANADA
A Water Quality Simulation Model,
W74-02683 5B

Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

Sedimentation on the Western Delta-Front of the Fraser River, British Columbia,
W74-03061 2L

Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

CANADA (BROME LAKE-QUE.)
Henneguya Sp. (Sporozoa:Myxosporida) As A Probable Cause of Death of Esox Niger in Brome Lake, Quebec,
W74-03025 2H

CANADA (SASKATCHEWAN RIVER)
Geobotanical Processes in the Saskatchewan River Delta,
W74-02866 2I

CANAL LININGS
Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

CANAL SEEPAGE
Groundwater Movement,
W74-03142 4B

CANALS
Canal Companies.
W74-02804 6E

CAPE COD
The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

CAPITAL
Optimal Investment Orders Under Uncertainty and Dynamic Costs: Theory and Estimates,
W74-03199 6B

CAPITAL IMPROVEMENTS
Functional Water and Sewer Report,
W74-03122 3D

CARBON
Output of Phosphorus, Dissolved Organic Carbon, and Fine Particulate Carbon from Hubbard Brook Watersheds,
W74-02759 2K

CARBON CYCLE
An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

CARBON DIOXIDE
The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

CARIBBEAN SEA
Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume III, Bibliography on Marine Geology and Geophysics.
W74-03055 2L

CARYOPHANON LATUM
Natural Habitat of Caryophanon latum,
W74-02966 5B

CASINGS
'Maximum Load' Casing Design,
W74-03157 8B

CATALYSTS
Catalytic Oxidation of Organics in Wastewater,
W74-02655 5D

CATALYTIC OXIDATION
Catalytic Oxidation of Organics in Wastewater,
W74-02655 5D

CATOSTOMID FISHES
Two New Species of Caryophyllid Tapeworms from Catostomid Fishes in Tennessee,
W74-02995 2I

CAUCASUS
Karst Waters of the Caucasus (Karstovyye vody Bol'shogo Kavkaza),
W74-02756 2E

CELL SIZE
Environmental Control of Phytoplankton Cell Size,
W74-02998 5C

CELL YIELD
Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

CENTRIFUGATION
A New Step Toward Waste Water Treatment (Un nouveau pas vers le traitement des eaux usees).
W74-03089 5D

CERAMIUM RUBRUM
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

CESTODA
Isoglaridacris agminis sp. n. (Cestoda: Caryophyllaeidae) from the Lake Chubsucker, Erimyzon sucetta (Lacepede),
W74-03097 2I

CHAMAESIPHON
On the Systematics and Ecology of the Genus Chamesiphon (Cyanophyceae). 2. Ecology (Zur Systematik und Okologie det Gattung Chamesiphon (Cyanophyceae) 2. Okologie),
W74-02952 5C

CHANCE-CONSTRAINED PROGRAMMING
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

CHANNEL EROSION
A Bill to Authorize the Secretary of the Army to Investigate, Plan, and Construct Projects for the Control of Streambank Erosion.
W74-02789 6E

CHANNEL FLOW
Stream Channelization (Part 6).
W74-02778 6G

CHANNEL IMPROVEMENT
Benthic Dredge Construction,
W74-03022 8C

CHANNEL MORPHOLOGY
Role of Depth of Channel Downcutting in the Formation of Low Flow in Mountain Streams (Rol' glubiny vreza rusel v formirovanii mazhennogo stoka gornykh rek),
W74-02753 2E

Minimization of Power Expenditure in a Riffle-Pool Alluvial Channel,
W74-02768 2J

CHANNELING
Stream Channelization (Part 6).
W74-02778 6G

CHANNELS
Stream Channelization (Part 5).
W74-02777 6G

Chincoteague Inlet, Navigation Project, Accomack County, Virginia (Final Environmental Statement).
W74-02800 8A

CHARACTERIZATION
Survival of Bacteria in Extreme Environments,
W74-02962 5C

CHARLOTTE (NC)
The Liquid Waste Facilities Function Concept.
W74-03039 5D

CHELATING AGENTS
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

CHELATION
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

Incorporation of Uranium in Modern Corals,
W74-03064 2K

CHEMCONTROL
Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

CHEMICAL ANALYSIS
Instrumental Analysis of Chemical Pollutants--Training Manual.
W74-02739 5A

Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

CHEMICAL CONTROL
Some Aspects of Chemical Control of Soil-Borne Pathogens,
W74-02889 5B

CHEMICAL INDUSTRY
Effect of Hydrolysis Plant Effluents on Fish (Vliyanne na ryb stochnykh vod gidroliznogo zavoda),
W74-03074 5C

CHEMICAL PHYSICAL TREATMENT
Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

CHEMICAL PROPERTIES
Studies on a Saline Lake Ecosystem,
W74-02920 5C

CHEMICAL REACTIONS
Method for Treating Sewage,
W74-03012 5D

Fractionation and Characterization of Natural Organic Matter from Certain Rivers and Soils by Free-Flow Electrophoresis,
W74-03062 2K

CHEMICAL WASTES
Lake Michigan Discharge Studies.
W74-02954 5B

CHESAPEAKE BAY
An Annual Plankton Cycle on the Chesapeake Bay in the Vicinity of Calvert Cliffs, Maryland, June 1969 - May, 1970,
W74-02863 5C

A Statement Prepared for Submission at the Public Hearing on Application Made by Baltimore Gas and Electric Company for a Permit to Appropriate and Use Surface Water for Operation of the Calvert Cliffs Nuclear Power Plant Made to the Maryland Department of Water Resources,
W74-02886 5C

Chesapeake Bay Model Study for Calvert Cliffs,
W74-02905 5B

CHICAGO (ILL)
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

CHLORELLA
Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

The Effect of Ethylenediaminetetraacetic Acid on the Growth of Chlorella Pyrenoidosa and Its Role in the Dynamics of Metabolism and Accessibility of Iron and Calcium,
W74-02925 5C

CHLORELLA PYRENOIDOSA
The Effect of Ethylenediaminetetraacetic Acid on the Growth of Chlorella Pyrenoidosa and Its Role in the Dynamics of Metabolism and Accessibility of Iron and Calcium,
W74-02925 5C

CHLORINATED HYDROCARBON PESTICIDES
The Identification and Measurement of Chlorinated Hydrocarbon Pesticides Accumulated From Urban Runoff,
W74-02665 5A

CHLORINATION
Indirector Chlorinator,
W74-02999 5D

Sewage Treatment Vessel,
W74-03016 5D

Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

CHLORINE
Indirector Chlorinator,
W74-02999 5D

CHLOROPHYTA
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

CHROMATOGRAPHY
Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

CHROMIUM
Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

CITIES
The Liquid Waste Facilities Function Concept.
W74-03039 5D

CLAY MINERALS
The Measurement of the Heat of Reaction Between Proteins and Clay Minerals by Microcalorimetry,
W74-02669 2G

CLAYS
Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

CLEAR LAKE (CALIF)
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

CLIMATES
Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2J

CLOSTRIDIUM BOTULINUM
The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

CLOUD SEEDING
Weather Modification Operations in California, October 1, 1968 - September 30, 1969,
W74-03056 3B

COAGULATION
Apparatus for Separating Paint or the Like from Water,
W74-03008 5D

Color Removal and Sludge Recovery from Total Mill Effluent,
W74-03077 5D

COAL MINE WASTES
U.S. V. Valley Camp Coal Company (Violation of Federal Statute Prohibiting Discharge of Refuse Matter into Navigable Waters).
W74-02810 6E

United States V. Kentland-Elkhorn Coal Corporation (Injunctive Relief Sought Against Defendant to Cause Cessation of Blackwater Discharge into Federally protected Waters).
W74-02815 6E

COASTAL MANAGEMENT
Clearwater Coastal Zone Management Plan.
W74-03116 2L

COASTAL MARSHES
Clearwater Coastal Zone Management Plan.
W74-03116 2L

COASTAL STRUCTURES
Crater-Sink Sand Transfer System,
W74-02705 8A

Sand Budget for Capitola Beach, California,
W74-02718 8B

The Great Atlantic Coast Tides of 5-8 March 1962,
W74-03099 2J

Feasibility of Modeling Run-up Effects of Dispersive Water Waves,
W74-03106 8B

COASTAL WATERS
Disposal of Waste Materials at Sea.
W74-02819 6E

COASTAL ZONE MANAGEMENT
Managing our Coastal Zone.
W74-03037 5G

COASTS
A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

Littoral Fauna Along the NW Coast of the Sea of Japan,
W74-02691 2L

Hurricane Surge Frequency Estimated for the Gulf Coast of Texas,
W74-02700 2L

Coastal Imagery Data Bank: Interim Report,
W74-02701 2L

Coastal Sand Dunes of Guerrero Negro, Baja California, Mexico,
W74-02704 2L

Tidal Current Surveys by Photogrammetric Methods,
W74-02707 2L

Sea Waves in Coastal Waters of the British Isles,
W74-02710 2L

A Numerical Model of Coastal Upwelling,
W74-02713 2E

A Preliminary Investigation of the Recent Sediments Off the East Coast of Australia,
W74-02714 2J

Residual Currents in Relation to Shoreline Evolution of the East Anglian Coast,
W74-02720 2J

Managing our Coastal Zone.
W74-03037 5G

Research in the Coastal and Oceanic Environment,
W74-03096 2J

Clearwater Coastal Zone Management Plan.
W74-03116 2L

COLD RESISTANCE
Experimental Ecological Investigations of Chironomus thummi and Chironomus piger (Diptera, Chironomidae). (Experimentell-okologishe Untersuchungen an Chironomus thummi und Chironomus piger (Diptera, Chironomidae),
W74-02963 5C

COLLAPSE
'Maximum Load' Casing Design,
W74-03157 8B

COLONIZING PROTOZOANS
Preliminary Report on Simulated Passage Effect of Potential Colonizing Protozoans Through Condenser of a Steam Electric Power Generating Plant Upon Downstream Protozoan Community Development,
W74-02930 5C

COLOR
Color Removal and Sludge Recovery from Total Mill Effluent,
W74-03077 5D

COLORADO
Water Resources Data for Colorado, 1972: Part 1. Surface-Water Records.
W74-02724 7C

Bottom Fauna Changes During Artificial Reservoir Destratification,
W74-02992 5C

Functional Water and Sewer Report,
W74-03122 3D

Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

COLORIMETRY
Determination of Furfural in Water and Asphalt (In Polish),
W74-02798 5A

COLUMBIA RIVER
Effect on Organisms of Entrainment in Cooling Water: Steps Toward Predictability,
W74-02894 5C

Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

COMBINED SEWER OVERFLOW
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

COMBINED SEWERS
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

COMMERCIAL FISHING
Population Studies of Bigmouth Buffalo in Coralville Reservoir with Special Reference to Commercial Harvest,
W74-03036 8I

Economic and Political Objectives in Fishery Management,
W74-03195 6B

COMPREHENSIVE PLANNING
River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

Multigoal Water Quality Planning Model,
W74-02678 5B

Comprehensive Water and Sewer Study, Hamilton, Walker, and Catoosa Counties, (Book Two).
W74-02833 5D

Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

Regional Planning for Sewerage Systems,
W74-02860 6A

COMPRESSIVE STRENGTH
Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

COMPUTER LANGUAGE
New Simulation Approaches to the Modeling of Environmental Systems,
W74-02684 6A

COMPUTER MODELS
A Methodology for Assessing Environmental Impact of Water Resources Development.
W74-02822 6B

COMPUTER PROGRAMS
Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

New Simulation Approaches to the Modeling of Environmental Systems,
W74-02684 6A

A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

Storage and Retrieval of Water Quality Data--Training Manual.
W74-03171 5A

CONCRETE STRUCTURES
Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

CONDENSATION
Free Convection Film Condensation of Steam in the Presence of Non-Condensing Gases,
W74-02896 8B

CONFERENCES
All-Union Conference on Use and Conservation of Water Resources (Vsesoyuznoye soveshchaniye po ispol'zovaniyu i okhrane vodnykh resursov),
W74-02748 6B

Conservation of Water Resources and Their Rational Use in the National Economy (Okhrana vodnykh resursov i ikh ratsional'noye ispol'zovaniye v narodnom khozyaystve),
W74-02749 5D

Managing our Coastal Zone.
W74-03037 5G

CONIFEROUS TREES
Simulation Model for Evaluation of Interception Loss from Forest Trees, Part I. Modeling Snow Interception on Conifers and Part II. Laboratory Modeling of Snow Interception on Trees,
W74-02656 2I

CONNECTICUT RIVER
Diversion of Flood Flows from the Connecticut River and the Effect on Groundwater Supplies,
W74-02847 4B

Calefaction of the Connecticut River, U.S.A.,
W74-02864 5B

CONNECTICUT RIVER BASIN
A Methodology for Assessing Environmental Impact of Water Resources Development.
W74-02822 6B

CONSTRUCTION
Chincoteague Inlet, Navigation Project, Accomack County, Virginia (Final Environmental Statement).
W74-02800 8A

The Jacking Method in Tunnel Construction,
W74-02855 8A

CONTINENTAL SHELF
Temperature Trends and the Distribution of Groundfish in Continental Shelf Waters, Nova Scotia to Long Island,
W74-02867 5C

CONTROL CHARTS
Statistical Analysis of Biological Data from Preoperational-Postoperational Industrial Water Quality Monitoring,
W74-02993 5A

CONTROL SYSTEMS
Energy Signature Measures System Changes,
W74-02981 7B

CONVECTION
High Reynolds Numbers Unsteady Convective Mass Transfer from Fluid Spheres,
W74-02891 2B

Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

COOLING
Observations on the Response of Some Benthonic Organisms to Power Station Cooling Water,
W74-02881 5C

COOLING TOWERS
Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

COOLING WATER
The Cooling Water of Power Stations: A New Factor in the Environment of Marine and Fresh-Water Invertebrates,
W74-02879 5C

Sun Treats Cooling Water Without Chromates for Corrosion Protection,
W74-03160 8G

COPEPODS
Decomposition of Marine Copepods,
W74-02973 5A

COPPER
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

CORAL
Incorporation of Uranium in Modern Corals,
W74-03064 2K

CORALVILLE RESERVOIR (IOWA)
Population Studies of Bigmouth Buffalo in Coralville Reservoir with Special Reference to Commercial Harvest,
W74-03036 8I

CORE ANALYSIS PROCEDURES
Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

CORRELATION ANALYSIS
Investigation of Correlation of Annual Runoff for Appalachian Rivers (Issledovaniye korrelyativnoy svyazi godovogo stoka Appalachskikh rek),
W74-02752 2E

CORROSION CONTROL
MGCO3 Addition to CASO4 Containing Sea Water to Prevent Corrosion,
W74-03010 3A

Sun Treats Cooling Water Without Chromates for Corrosion Protection,
W74-03160 8G

COST ANALYSIS
Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

COST-BENEFIT ANALYSIS
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

COST-BENEFIT ANALYSIS

Wells and Welfare. An Exploratory Cost-Benefit Study of the Economics of Small-Scale Irrigation in Maharashtra,
W74-03192 6B

COST MINIMIZATION
Multigoal Water Quality Planning Model,
W74-02678 5B

COSTS
Design Optimization for Biological Filter Models,
W74-02679 5D

X-Y Recorders.
W74-02969 7C

COTTON
Loss of Nitrogen from Various Nitrogen Fertilizers on Irrigated Land,
W74-02936 3F

CRABS
Partitioning of the Estuarine Environment by Two Species of Cancer,
W74-02717 2L

CREEP
Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

CROP PRODUCTION
Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

Water Requirements of Various Crops in Arid and Semi-Arid Zones of Turkey,
W74-02937 3F

CRUSTACEA (PHYLLOPOD)
Respiration and Thermal Tolerance of Phyllopod Crustacea Triops longicaudatus and Thamnocephalus platyurus Inhabiting Desert Ephermeral Ponds,
W74-03090 2H

CRUSTACEANS
Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

CULTURES
The Effect of Ethylenediaminetetraacetic Acid on the Growth of Chlorella Pyrenoidosa and Its Role in the Dynamics of Metabolism and Accessibility of Iron and Calcium,
W74-02925 5C

CURRENTS (WATER)
Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

Tidal Current Surveys by Photogrammetric Methods,
W74-02707 2L

Residual Currents in Relation to Shoreline Evolution of the East Anglian Coast,
W74-02720 2J

Currents and Water Masses,
W74-03029 2E

The Surface Waters off the Coast of Kerala, South-West India,
W74-03103 2E

Sediment Transport by Waves and Currents,
W74-03111 2J

CYANOPHYTA
Associated Organelles in the Blue-Green Alga, Anacystis Nidulans,
W74-02927 5C

On the Systematics and Ecology of the Genus Chamesiphon (Cyanophyceae). 2. Ecology (Zur Systematik und Okologie det Gattung Chamesiphon (Cyanophyceae) 2. Okologie),
W74-02952 5C

The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

Method for the Selective Enumeration of Blue-Green Bacteria in Water,
W74-02974 5A

A Portable Apparatus for Measuring Relative Gas Vacuolation, The Strength of Gas Vacuoles, and Turgor Pressure in Planktonic Blue-Green Algae and Bacteria,
W74-02976 5A

CYCLING NUTRIENTS
Output of Phosphorus, Dissolved Organic Carbon, and Fine Particulate Carbon from Hubbard Brook Watersheds,
W74-02759 2K

CYTOLOGICAL STUDIES
Associated Organelles in the Blue-Green Alga, Anacystis Nidulans,
W74-02927 5C

The Appearance of Nitrate Reductase Activity in Nitrogen-Starved Cells of Ankistrodesmus Braunii,
W74-02929 5C

Survival of Bacteria in Extreme Environments,
W74-02962 5C

DAM DESIGN
Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

DAMS
Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

DAMSITES
Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

DANUBE RIVER
Contribution to Knowledge about the Algae (Excluding Bacillariophyceae) of Stagnant Waters of the Iron Gates of the Danube,
W74-02699 5C

DATA ACQUISITION
Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

DATA ACQUISITION SYSTEMS
Low-Cost Digital Data Acquisition Systems,
W74-02980 7C

DATA COLLECTIONS
Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

Coastal Imagery Data Bank: Interim Report,
W74-02701 2L

Use of Censored Data in the Estimation of Gumbel Distribution Parameters for Annual Maximum Flood Series,
W74-02763 2E

Cross Correlation of the Logarithms of Estimates of Mean Streamflows,
W74-02775 2E

A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

DATA INTERPRETATION
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

DATA PROCESSING
A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

On-Line Signal Digitizing for Computer Input,
W74-02950 7C

Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

Low-Cost Digital Data Acquisition Systems,
W74-02980 7C

Digital Magnetic Recording of Wideband Analog Signals,
W74-02982 7C

Storage and Retrieval of Water Quality Data--Training Manual.
W74-03171 5A

DATA STORAGE AND RETRIEVAL
Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

Minnesota Natural Resource Information System,
W74-03053 10B

Storage and Retrieval of Water Quality Data--Training Manual.
W74-03171 5A

ATA TRANSMISSION
Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

Guide to Selecting Digital Multiplexers,
W74-02983 7C

EAD-REEF SHELL DREDGING
Permit Application by Radcliff Materials, Inc.--Dredging of Dead-Reef Shells, Mobile Bay, Alabama (Final Environmental Statement). 21Available NTIS, Springfield, Va. 22151 as EIS-AL-73-0542-F, Price $12.00 printed copy. February 1973. 187 p, 44 ref.
W74-02737 6G

EAERATION
Sun Treats Cooling Water Without Chromates for Corrosion Protection,
W74-03160 8G

ECISION MAKING
The Legal and Regulatory Framework for Thermal Discharge from Nuclear Power Plants,
W74-02875 5G

A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

EEP TUNNEL STORAGE
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

EEP-WELL PUMPING
Deep Well Submersibles are Growing,
W74-03147 8C

EFICIENT ELEMENTS
Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophyliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

EFLECTION
The Role of Rock Strength Anisotropy in Natural Hole Deviation,
W74-03156 8B

ELAWARE
A Study of the Optimal Mix of Private and Public Action for Local and Regional Water Conservation,
W74-02654 6B

ELAWARE BAY
Research in the Coastal and Oceanic Environment,
W74-03096 2J

ELTAS
Sedimentation on the Western Delta-Front of the Fraser River, British Columbia,
W74-03061 2L

Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

DEMAND CURVE
Value Comparisons in Free-Flowing Stream Development,
W74-03190 6B

DEMONSTRATION WATERSHEDS
Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

DENSITY
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

DENVER (COLORADO)
The Denver System of Controls,
W74-02854 5F

DEPOSITION (SEDIMENTS)
Antidune and Chute and Pool Structures in the Base Surge Deposits of the Laacher See Area, Germany,
W74-03063 2J

DESALINATION
Dynamics Reverse Osmosis Membranes of Ultrathin Discs,
W74-03009 3A

MGCO3 Addition to CASO4 Containing Sea Water to Prevent Corrosion,
W74-03010 3A

Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

Sun Treats Cooling Water Without Chromates for Corrosion Protection,
W74-03160 8G

DESERT PLANTS
Russian-Thistle (Salsola) Species in Western United States,
W74-02945 4A

DESIGN
Design Optimization for Biological Filter Models,
W74-02679 5D

Heat Transfer Fouling Through Growth of Calcareous Film Deposits,
W74-02882 8G

DESIGN CRITERIA
Boulder Creek Flood Control Project--An Environmental Status Report,
W74-02859 6F

Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

'Maximum Load' Casing Design,
W74-03157 8B

DESIGN STANDARDS
'Maximum Load' Casing Design,
W74-03157 8B

DESTRATIFICATION
Bottom Fauna Changes During Artificial Reservoir Destratification,
W74-02992 5C

DETECTION LIMITS
Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

DEVILS LAKE (N.D.)
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

DEWATERING
Process of Removing Water from Slimes,
W74-03007 5G

Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

A German Filter Belt Press (La Siebbandpresse),
W74-03088 5D

A New Step Toward Waste Water Treatment (Un nouveau pas vers le traitement des eaux usees).
W74-03089 5D

DIATOMS
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

DIELDRIN
Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

DIFFUSION
Heat Transfer Fouling Through Growth of Calcareous Film Deposits,
W74-02882 8G

Diffusion,
W74-03030 5B

First Experimental Results on the Diffusion of Fresh Water in a shallow bay,
W74-03100 2L

DIGITAL COMPUTERS
New Simulation Approaches to the Modeling of Environmental Systems,
W74-02684 6A

DILUTION
Variation in Results of Identical Bioassays of Minnows Subjected to Instant Temperature Increase,
W74-02898 5C

DIMENSIONS
A Morphometric Description of Lake Issyk-Kul' (Morformetricheskaya kharakteristika ozera Issyk-Kul'),
W74-02755 2H

DIPTERA
Experimental Ecological Investigations of Chironomus thummi and Chironomus piger (Diptera, Chironomidae). (Experimentell-okologishe Untersuchungen an Chironomus

thummi und Chironomus piger (Diptera, Chironomidae),
W74-02963 5C

DISCHARGE
Southern Mutual Investment Corporation V. Langston (Suit for Damages Resulting from Diversion of Surface Waters).
W74-02807 6E

DISPERSION
Dispersal Processes of Freshwaters in the Po River Coastal Area,
W74-02758 2E

Diffusion,
W74-03030 5B

DISSOLVED OXYGEN
Multigoal Water Quality Planning Model,
W74-02678 5B

Experimental Ecological Investigations of Chironomus thummi and Chironomus piger (Diptera, Chironomidae). (Experimentell-okologishe Untersuchungen an Chironomus thummi und Chironomus piger (Diptera, Chironomidae),
W74-02963 5C

Sun Treats Cooling Water Without Chromates for Corrosion Protection,
W74-03160 8G

DISSOLVED SOLIDS
Total Dissolved Electrolyte Effects on Periphyton,
W74-02990 5C

DISTRIBUTION PATTERNS
The Idaho System for the Distribution of Water Among Its Appropriators: An Examination and Assessment,
W74-02793 6E

Temperature Trends and the Distribution of Groundfish in Continental Shelf Waters, Nova Scotia to Long Island,
W74-02867 5C

Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

DIURNAL
Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

Computation of the Sensible Heat Flux and Its Relation to Other Components of the Heat Balance at the Surface,
W74-02940 2D

DOMESTIC WASTES
Waste Treatment for Small Flows,
W74-02723 5D

Lake Michigan Discharge Studies.
W74-02954 5B

DOMINANT ORGANISMS
The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

DRAINAGE
Indiana Drainage Code--Drainage Boards--Powers and Duties.
W74-02803 6E

Clemson University V. First Provident Corporation (Suit to Enjoin Trespass Upon Servient Lands).
W74-02808 6E

Laying Out, Altering and Discontinuing Highways.
W74-03132 6E

DRAINAGE DISTRICT
Drainage Districts in Connection with United States Levees.
W74-02814 6E

DRAINAGE DISTRICTS
Drainage Districts.
W74-02816 6E

DRAWDOWN
Drawdown Distribution Due to Well Fields in Coupled in Coupled Leaky Aquifers, 1. Infinite Aquifer System,
W74-02773 2F

Groundwater Movement,
W74-03142 4B

Mutual Interference of Water Wells,
W74-03154 8B

Steady and Unsteady Flow Towards Gravity Wells,
W74-03161 4B

Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

DREDGES
Benthic Dredge Construction,
W74-03022 8C

DREDGING
Permit Application by Radcliff Materials, Inc.--Dredging of Dead-Reef Shells, Mobile Bay, Alabama (Final Environmental Statement). 21Available NTIS, Springfield, Va. 22151 as EIS-AL-73-0542-F, Price $12.00 printed copy. February 1973. 187 p, 44 ref.
W74-02737 6G

DRILLING
Random Drilling for Water in Carbonate Rocks,
W74-03141 8B

DRILLING FLUIDS
Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

Easier, More Exact Method Speeds Annulus Pressure-Loss Calculations,
W74-03162 8G

DROUGHTS
Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

DRYING
Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

Effect of Drying on Water Retention of a Pud dled Soil,
W74-03186 2(

DUAL WATER SYSTEMS
Planning for Water Resue,
W74-02845 5I

DUNES
Coastal Sand Dunes of Guerrero Negro, Baj California, Mexico,
W74-02704 2I

The Great Atlantic Coast Tides of 5-8 Marc 1962,
W74-03099 2

DUPUIT-FORCHHEIMER EQUATIONS
Groundwater Movement,
W74-03142 4I

DYE CONCENTRATIONS
The Adsorption of Rhodamine-B on to Mater als Carried in Suspension by Inshore Waters,
W74-02721 5I

DYE DISPERSION
A Study of Water Circulation in Monterey Ha bor Using Rhodamine B Dye,
W74-03114 2I

DYNAMIC PROGRAMMING
A Statistical Approach to Dynamic Modelin and Control of Water Distribution Systems,
W74-02673 4A

Flood Control Project Planning by Mathemat cal Programming: A Project-Expansion Ap proach,
W74-02674 4A

The Economic Effects of Floods. Investiga tions of a Stochastic Model of Rational Invest ment Behavior in the Face of Floods,
W74-03193 6A

DYNAMICS
Plankton Dynamics in a Newfoundland Lake,
W74-02926 5(

DYNAMOMETERS
Energy Measurements in the Swash-Surf Zone
W74-02702 2I

E. COLI
Escherichia coli Serogroups Isolated fro Streams in Pennsylvania, 1965 to 1972,
W74-02988 5A

EAGLE NEST LAKE (NM)
Eagle Nest Lake: Revised Appraisal.
W74-03188 6I

EARTH-PENETRATION
Terradynamics,
W74-03165 8I

EARTH TIDES
Computing the Barometric Efficiency of Well,
W74-03167 8I

EASEMENTS
Clemson University V. First Provident Cor poration (Suit to Enjoin Trespass Upon Ser vient Lands).
W74-02808 6E

ECHINODERMS
Respiration Rates of Some New Zealan Echinoderms (Note),
W74-02949 5A

COLIBRIUM
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

COLOGICAL DISTRIBUTION
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

COLOGICAL STUDIES
An Ecological Study on the So-Called Mogai (Anadara subcrenata (Lischke)) Cultured in the Kasaoka Bay (In Japanese),
W74-02690 5C

COLOGY
On the Systematics and Ecology of the Genus Chamesiphon (Cyanophyceae). 2. Ecology (Zur Systematik und Okologie det Gattung Chamesiphon (Cyanophyceae) 2. Okologie),
W74-02952 5C

Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

CONOMETRIC MODELS
A Forecasting Model Applied to Pollution Control Costs,
W74-03189 5G

CONOMETRICS
A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

CONOMIC EFFICIENCY
Economic and Social Purposes Related to Water Management,
W74-03197 6B

CONOMIC FEASIBILITY
Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

An Economic Feasibility Study of Fayetteville, North Carolina, Treating Fort Bragg's Wastewater,
W74-03187 5D

CONOMIC IMPACT
Pa Mong Stage one Feasibility Report. Appendix VI. Economic, Agricultural, Social and Financial Analysis.
W74-02686 6B

A Forecasting Model Applied to Pollution Control Costs,
W74-03189 5G

The Economic Effects of Floods. Investigations of a Stochastic Model of Rational Investment Behavior in the Face of Floods,
W74-03193 6A

CONOMIC JUSTIFICATION
Value Comparisons in Free-Flowing Stream Development,
W74-03190 6B

CONOMIC POLICY
Economic Policy for Water Resources and Placement Flows,
W74-03191 4B

CONOMIC PREDICTION
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

ECONOMICS
Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

Social and Economic Impact on Urban Areas of 'Water Policies for the Future,' the National Water Commission Report,
W74-03177 6B

Policy Issues Related to Urbanization,
W74-03178 6B

ECOSYSTEMS
Growth of an Adherent Mixed Microbial Culture in a Substrate Limited Single State Chemostat,
W74-02661 5C

EEL PONDS
On Environmental Factors of Eel Ponds: Chemistry of Water and Soil and Plankton in March and June 1967, (In Japanese),
W74-02933 2H

EFFLUENTS
Characteristics of Steam Electric Condenser Cooling Waters,
W74-02869 5B

A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

EL CARPINCHO (ARGENTINA)
Pollution of the 'El Carpincho' Pond (Pampasic Region, Argentina) and Its Effects on Plankton and Fish Communities,
W74-02923 5C

ELASTICITY
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

ELECTRIC MOTOR DESIGN
Deep Well Submersibles are Growing,
W74-03147 8C

ELECTRIC MOTORS
Deep Well Submersibles are Growing,
W74-03147 8C

ELECTRIC POWER PLANTS
Preliminary Report on Simulated Passage Effect of Potential Colonizing Protozoans Through Condenser of a Steam Electric Power Generating Plant Upon Downstream Protozoan Community Development,
W74-02930 5C

ELECTRIC POWER PRODUCTION
MHD Central Power: A Status Report,
W74-02871 5B

Stimulation Modes of Geothermal Aquifers,
W74-02876 4B

Power Plant Effluent - Thermal Pollution or Energy at a Bargain Price,
W74-02888 5B

ELECTRIC POWERPLANT
Lake Michigan Discharge Studies.
W74-02954 5B

ELECTRICAL WELL LOGGING
A Double-Electrode Method of Spontaneous Potential Logging,
W74-03170 8G

ELECTROACTIVE SPECIES
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

ELECTRODES
Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

A Double-Electrode Method of Spontaneous Potential Logging,
W74-03170 8G

ELECTROLYSIS
Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

ELECTROLYTES
Total Dissolved Electrolyte Effects on Periphyton,
W74-02990 5C

ELECTRON MICROSCOPY
Electron Microscopic Investigation of Natural Bacterial Populations in the Water and Sediment of Lake Balaton and Lake Belso,
W74-02725 5A

The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

ELECTRONIC EQUIPMENT
X-Y Recorders.
W74-02969 7C

Digital Magnetic Recording of Wideband Analog Signals,
W74-02982 7C

EMBRYONIC GROWTH STAGE
Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

ENCROACHMENT
Preservation of Reservoir Sites,
W74-03123 6I

ENERGY
Energy Measurements in the Swash-Surf Zone
W74-02702 2J

Environmental Levels of Radioactivity a Atomic Energy Commission Installations.
W74-03136 5A

ENERGY BUDGET
A Study of Evapotranspiration from a Dougla Fir Forest Using the Energy Balance Approach,
W74-02764 2D

Determination of the Heat Capacity of Lak Kariba,
W74-02910 2H

ENGINEERING STRUCTURES
Crater-Sink Sand Transfer System,
W74-02705 8A

ENGLAND
Civil Liability of Shipowners for Oil Pollution,
W74-02796 6E

ENTHALPY
Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

ENVIRONMENT
Summary of Legislative and Regulatory Activities Affecting the Environmental Quality of Nuclear Facilities.
W74-02890 5G

Primary Publications in Environmental Science,
W74-03044 10A

ENVIRONMENTAL CONTROL
4 Water Pollution, Environmental Enhancement Study.
W74-02856 5G

An Inventory of Environmental Resources Research in Progress, Colorado State University.
W74-03133 6G

A Bill to Amend the Act of March 3, 1899, Commonly Referred to as the Refuse Act Relating to the Issuance of Certain Permits.
W74-03134 6E

ENVIRONMENTAL EFFECTS
The Pollution Potential in Pesticide Manufacturing.
W74-02685 5C

Stream Channelization (Part 6).
W74-02778 6G

A Methodology for Assessing Environmental Impact of Water Resources Development.
W74-02822 6B

4 Water Pollution, Environmental Enhancement Study.
W74-02856 5G

Boulder Creek Flood Control Project--An Environmental Status Report,
W74-02859 6F

The Realities of Thermal Pollution - Environmental Limitations and Ecological Adaptations,
W74-02870 5C

A Statement Prepared for Submission at the Public Hearing on Application Made by Baltimore Gas and Electric Company for a Permit to Appropriate and Use Surface Water for Operation of the Calvert Cliffs Nuclear Power Plant Made to the Maryland Department of Water Resources,
W74-02886 5C

On the Systematics and Ecology of the Genus Chamesiphon (Cyanophyceae). 2. Ecology (Zur Systematik und Okologie det Gattung Chamesiphon (Cyanophyceae) 2. Okologie),
W74-02952 5C

Environmental Control of Phytoplankton Cell Size,
W74-02998 5C

Environmental Assessment; Pollution Abatement Project, Las Vegas Wash and Bay, Annex B.
W74-03118 5D

Final Environmental Impact Statement for Modification of a Boat Dock and Ramp.
W74-03124 6G

Problems and Instruments Relating to the Allocation of Environmental Costs.
W74-03198 6B

ENVIRONMENTAL ENGINEERING
Boulder Creek Flood Control Project--An Environmental Status Report,
W74-02859 6F

ENVIRONMENTAL FACTORS
On Environmental Factors of Eel Ponds: Chemistry of Water and Soil and Plankton in March and June 1967, (In Japanese),
W74-02933 2H

ENVIRONMENTAL IMPACT STATEMENTS
Permit Application by Radcliff Materials, Inc.--Dredging of Dead-Reef Shells, Mobile Bay, Alabama (Final Environmental Statement). 21Available NTIS, Springfield, Va. 22151 as EIS-AL-73-0542-F, Price $12.00 printed copy. February 1973. 187 p, 44 ref.
W74-02737 6G

Chincoteague Inlet, Navigation Project, Accomack County, Virginia (Final Environmental Statement).
W74-02800 8A

Pollution Abatement Project, Bandelier National Monument, New Mexico (Final Environmental Impact Statement).
W74-02801 5D

Final Environmental Impact Statement for Modification of a Boat Dock and Ramp.
W74-03124 6G

Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

ENVIRONMENTAL SYSTEMS
New Simulation Approaches to the Modeling of Environmental Systems,
W74-02684 6A

ENZYMES
The Appearance of Nitrate Reductase Activity in Nitrogen-Starved Cells of Ankistrodesmus Braunii,
W74-02929 5C

EQUIPMENT
Wastewater Cleanup Equipment.
W74-03082 5D

EQUITY
Economic and Social Purposes Related to Water Management,
W74-03197 6B

EROSION
Mudflow Properties and Patterns (O svoystvakh i zakonomernostyakh selevykh potokov),
W74-02750 2J

Sedimentation on the Western Delta-Front of the Fraser River, British Columbia,
W74-03061 2L

EROSION CONTROL
Plant Species as Wildlife Cover and Erosion Control on 'Mudflats' in Iowa's Lareg Reservoir Systems,
W74-02666 4D

An Overview of Maryland's Sediment Control Program,
W74-02852 5G

Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities.
W74-02946 5G

ESOX-NIGER
Henneguya Sp. (Sporozoa:Myxosporida) As A Probable Cause of Death of Esox Niger in Brome Lake, Quebec,
W74-03025 2H

ESTIMATED COSTS
Deep Well Submersibles are Growing,
W74-03147 8C

ESTUARIES
Surface Circulation of Lakes and Nearly Land Locked Seas,
W74-02715 2H

The Adsorption of Rhodamine-B on to Materials Carried in Suspension by Inshore Waters,
W74-02721 5B

Disposal of Brine into An Estuary,
W74-02735 5B

Baylands Salt Water Flood Control Plannin Study.
W74-02829 4A

A Study of Commercially Important Estuarine Dependent Industrial Fishes,
W74-02839 6G

A Hydrologic Reconnaissance of the Pascagoula River Estuary, Mississippi,
W74-03094 2L

First Experimental Results on the Diffusion o Fresh Water in a shallow bay,
W74-03100 2L

Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

ESTUARINE
Characteristics of Steam Electric Condens Cooling Waters,
W74-02869 5B

ESTUARINE ENVIRONMENT
Partitioning of the Estuarine Environment b Two Species of Cancer,
W74-02717 2L

A Statement Prepared for Submission at th Public Hearing on Application Made by Ba timore Gas and Electric Company for a Perm to Appropriate and Use Surface Water fo Operation of the Calvert Cliffs Nuclear Pow Plant Made to the Maryland Department Water Resources,
W74-02886 5C

ESTUARINE FISHERIES
A Study of Commercially Important Estuarin Dependent Industrial Fishes,
W74-02839 6G

ETHYLENEDIAMINETETRAACETIC ACID
The Effect of Ethylenediaminetetraacetic Ac on the Growth of Chlorella Pyrenoidosa and Role in the Dynamics of Metabolism and A cessibility of Iron and Calcium,
W74-02925 5C

EUROPE
Effluent Treatment Plants in the Forest Products Industry (Puunjalostusteollisuuden jatevesipuhdistamot),
W74-03087 5D

EUTROPHICATION
Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

EVALUATION
Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

A Methodology for Assessing Environmental Impact of Water Resources Development.
W74-02822 6B

EVAPORATION
Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

EVAPORATION CONTROL
Evaporation Retardation by Monolayers,
W74-02774 3B

EVAPORATORS
Thermolytic Sewage System,
W74-03001 5D

MGCO3 Addition to CASO4 Containing Sea Water to Prevent Corrosion,
W74-03010 3A

EVAPOTRANSPIRATION
A Study of Evapotranspiration from a Douglas Fir Forest Using the Energy Balance Approach,
W74-02764 2D

Unsaturated Flow Properties Used to Predict Outflow and Evapotranspiration from a Sloping Lysimeter,
W74-02771 2D

Water Requirements of Various Crops in Arid and Semi-Arid Zones of Turkey,
W74-02937 3F

EVAPOTRASPIRATION
Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

EXCAVATION
Clemson University V. First Provident Corporation (Suit to Enjoin Trespass Upon Servient Lands).
W74-02808 6E

EXPLOSIONS
Feasibility of Modeling Run-up Effects of Dispersive Water Waves,
W74-03106 8B

EXPLOSIVES
Controlled Release of Avalanches by Explosives,
W74-02746 2C

FARM WASTES
Natural Habitat of Caryophanon latum,
W74-02966 5B

EPA Readies Farm Antipollution Guidelines.
W74-03128 5D

FATE OF POLLUTANTS
The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

FAULTS (GEOLOGIC)
Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

FEASIBILITY STUDIES
Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

FEDERAL BUDGET
Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974.
W74-02780 6E

Need to Improve Administration of the Water Pollution Research, Development, and Demonstration Program.
W74-03131 5G

FEDERAL GOVERNMENT
Preservation of Wilderness Areas--Hearing on S2453 and Related Wilderness Bills.
W74-02779 6E

Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974.
W74-02780 6E

River Basin Authorizations and Related Water Resource Projects.
W74-02781 4A

What About Water.
W74-03135 6E

FEDERAL-STATE WATER RIGHTS CONFLICT
Federally Reserved Rights to Underground Water-A Rising Question in the Arid West,
W74-02792 6E

FEDERAL WATER POLLUTION CONTROL ACT
Implementation of the Federal Water Pollution Control Act.
W74-02782 6E

The Federal Water Pollution Control Act Amendments of 1972: Ambiguity as a Control Device,
W74-02784 6E

The Federal Water Pollution Control Act Amendments of 1972.
W74-02785 6E

Regional Research Opportunities under EPA Sponsorship,
W74-03176 6B

Highlights and Issues of the 1972 Amendments to the Federal Water Pollution Control Act,
W74-03180 6B

FEEDLOTS
EPA Readies Farm Antipollution Guidelines.
W74-03128 5D

FERRIC IONS
Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

FERTILIZERS
Loss of Nitrogen from Various Nitrogen Fertilizers on Irrigated Land,
W74-02936 3F

FETCH
Sea Waves in Coastal Waters of the British Isles,
W74-02710 2L

The Great Atlantic Coast Tides of 5-8 March 1962,
W74-03099 2J

FILM CONDENSATION
Free Convection Film Condensation of Steam in the Presence of Non-Condensing Gases,
W74-02896 8B

FILMS
Fluorescent Spectroscopy, A Technique for Characterizing Surface Films,
W74-02731 5A

Heat Transfer Fouling Through Growth of Calcareous Film Deposits,
W74-02882 8G

FILTER PRESSES
A German Filter Belt Press (La Siebbandpresse),
W74-03088 5D

FILTERS
Design Optimization for Biological Filter Models,
W74-02679 5D

Filter Bottom and Molded Module Therefor,
W74-03006 5D

Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

FILTRATION
Iron Removal Filter System,
W74-03002 5F

Slurry Concentrator and Filter Apparatus,
W74-03003 5D

Continuously Regenerating Active Earth Filtering Apparatus for Liquid wastes,
W74-03004 5D

Filter Bottom and Molded Module Therefor,
W74-03006 5D

Apparatus for Separating Paint or the Like from Water,
W74-03008 5D

Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

FINLAND
Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

FIREHOLE RIVER
Effects of Thermal Additions from the Yellowstone Geyser Basins on the Bacteriology of the Firehole River,
W74-02895 5B

FISH
Influence of Temperature on Energy Utilization of Embryonic and Prolarval Tautog, Tautoga onitis,
W74-02872 5C

The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

Pollution of the 'El Carpincho' Pond (Pampasic Region, Argentina) and Its Effects on Plankton and Fish Communities,
W74-02923 5C

Effect of Hydrolysis Plant Effluents on Fish (Vliyanne na ryb stochnykh vod gidroliznogo zavoda),
W74-03074 5C

FISH CONTROL AGENTS
Rotenone Methods in a Large River System,
W74-02736 8I

FISH MANAGEMENT
A Study of Commercially Important Estuarine-Dependent Industrial Fishes,
W74-02839 6C

FISH POPULATIONS
Parametric Determination of Minimum Streamflow for Trout,
W74-02670 8I

Population Studies of Bigmouth Buffalo in Coralville Reservoir with Special Reference to Commercial Harvest,
W74-03036 8I

Checklist of Puget Sound Fishes,
W74-03060 2L

FISH REPRODUCTION
Preliminary Report on Small Fishes From the Hendrik Verwoed Dam, Orange River,
W74-02914 2H

Pacific Salmon Aquaculture Program--Incubation and Cultivation Phases,
W74-03028 2L

FISH SPECIES
Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

Checklist of Puget Sound Fishes,
W74-03060 2L

FISH TAXONOMY
Rotenone Methods in a Large River System,
W74-02736 8I

FISH TYPES
Rotenone Methods in a Large River System,
W74-02736 8I

Checklist of Puget Sound Fishes,
W74-03060 2L

FISHERIES
Pacific Salmon Aquaculture Program--Incubation and Cultivation Phases,
W74-03028 2L

Economic and Political Objectives in Fishery Management,
W74-03195 6B

FISHKILL
Predation, Particularly by Sculpins, on Salmon Fry in Fresh Waters of Washington,
W74-03058 2I

FLAGELLATES
A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

FLASH DISTILLATION
MGCO3 Addition to CASO4 Containing Sea Water to Prevent Corrosion,
W74-03010 3A

FLOATING BOOMS
Apparatus,
W74-03014 5G

FLOATING BREAKWATERS
Observations on Floating Breakwaters for Reflection of Shallow Water Waves (Recherches Sur Les Brise-Lames Flottants Destines A Reflechir La Houle En Eau Peu Profonde),
W74-02693 2J

FLOCCULATION
A New Step Toward Waste Water Treatment (Un nouveau pas vers le traitement des eaux usees).
W74-03089 5D

FLOOD CONTROL
Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

Flood Control Project Planning by Mathematical Programming: A Project-Expansion Approach,
W74-02674 4A

River Basin Authorizations and Related Water Resource Projects.
W74-02781 4A

Baylands Salt Water Flood Control Planning Study.
W74-02829 4A

Boulder Creek Flood Control Project--An Environmental Status Report,
W74-02859 6F

Efficient Flood Control of Dams Equipped with Crest Gates,
W74-02911 8C

FLOOD CONTROL ACT OF 1965
A Bill to Authorize the Secretary of the Army to Investigate, Plan, and Construct Projects for the Control of Streambank Erosion.
W74-02789 6E

FLOOD DAMAGE
Flood Plain Information for Harris Fork Creek and South Fulton Branch, Fulton, Kentucky and South Fulton, Tennessee.
W74-03125 4A

FLOOD DISCHARGE
Efficient Flood Control of Dams Equipped with Crest Gates,
W74-02911 8C

FLOOD FREQUENCY
Flood Plain Information for Harris Fork Creek and South Fulton Branch, Fulton, Kentucky and South Fulton, Tennessee.
W74-03125 4A

FLOOD PLAIN MANAGEMENT
Flood Plain Information for Harris Fork Creek and South Fulton Branch, Fulton, Kentucky and South Fulton, Tennessee.
W74-03125 4A

FLOOD PLAINS
Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

Stream Channelization (Part 5).
W74-02777 6G

FLOOD PROTECTION
River Basin Authorizations and Related Water Resource Projects.
W74-02781 4A

Flood Plain Information for Harris Fork Creek and South Fulton Branch, Fulton, Kentucky and South Fulton, Tennessee.
W74-03125 4A

FLOODING
Hurricane Surge Frequency Estimated for the Gulf Coast of Texas,
W74-02700 2L

FLOODS
Use of Censored Data in the Estimation of Gumbel Distribution Parameters for Annual Maximum Flood Series,
W74-02763 2E

Efficient Flood Control of Dams Equipped with Crest Gates,
W74-02911 8C

The Economic Effects of Floods. Investigations of a Stochastic Model of Rational Investment Behavior in the Face of Floods,
W74-03193 6A

FLORIDA
Clearwater Coastal Zone Management Plan.
W74-03116 2L

FLOTSAM
Skimmer for a Water Body,
W74-03017 5G

FLOW
Calculation of Heat Transfer in Turbulent Flow with Allowance for Secondary Flow,
W74-02904 8B

Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

FLOW MEASUREMENT
Industrial and High Velocity Metering,
W74-02858 5F

Surface Water Supply of the United States, 1966-70--Part 6. Missouri River Basin: Volume 2. Missouri River Basin from Williston, North Dakota, to Sioux City, Iowa.
W74-03035 7C

FLOW RATES
A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

FLUID FLOW
Energy Measurements in the Swash-Surf Zone,
W74-02702 2E

FLUID MECHANICS
On Generalized Hydrodynamic Equations Used in Heat Transfer Theory,
W74-02880 8B

Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

FLUID SPHERES
High Reynolds Numbers Unsteady Convective Mass Transfer from Fluid Spheres,
W74-02891 2B

FLUORESCENCE
Fluorescent Spectroscopy, A Technique for Characterizing Surface Films,
W74-02731 5A

Effect of Nitrite and Nitrate on Chlorophyll Fluorescence in Green Algae,
W74-02928 5C

FLUORESCENT MICROSCOPY
The Observation of Micro-Organisms on Surfaces by Incident Fluorescence Microscopy,
W74-02989 5A

FLUORIDES
Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

FLUOROMETRY
A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

FOAM SEPARATION
Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

FOG
Fog Drip from Artificial Leaves in a Fog Wind Tunnel,
W74-02765 2I

FOOD CHAINS
Growth of an Adherent Mixed Microbial Culture in a Substrate Limited Single State Chemostat,
W74-02661 5C

FORAGE GRASSES
The Seasonal Growth of Lovegrass (Eragrostis Curvula) on Deep Sandy Soils In A Semi-Arid Environment,
W74-02942 3F

Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

FORECASTING
Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume I, Time Series Analysis in Water Quality Modeling,
W74-02823 5B

Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume II, Nonlinear Filtration and Estimation in Water Quality Modeling,
W74-02824 5B

A Statement Prepared for Submission at the Public Hearing on Application Made by Baltimore Gas and Electric Company for a Permit to Appropriate and Use Surface Water for Operation of the Calvert Cliffs Nuclear Power Plant Made to the Maryland Department of Water Resources,
W74-02886 5C

Environmental Challenges and Nuclear Fuels,
W74-02892 5B

A Forecasting Model Applied to Pollution Control Costs,
W74-03189 5G

FOREIGN RESEARCH
Effluent Treatment Plants in the Forest Products Industry (Puunjalostusteollisuuden jatevesipuhdistamot),
W74-03087 5D

FOREST MANAGEMENT
Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities.
W74-02946 5G

Forest Management on the Watershed,
W74-03129 4C

FOREST WATERSHEDS
Land Use and Water Resources,
W74-03024 2A

Forest Management on the Watershed,
W74-03129 4C

FORESTS
A Study of Evapotranspiration from a Douglas Fir Forest Using the Energy Balance Approach,
W74-02764 2D

Fog Drip from Artificial Leaves in a Fog Wind Tunnel,
W74-02765 2I

FOULING
Heat Transfer Fouling Through Growth of Calcareous Film Deposits,
W74-02882 8G

FOUNDATION ROCKS
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

Physical Properties of some Typical Foundation Rocks.
W74-03145 8E

FOURIER ANALYSIS
Mean Rainfall and Mean Runoff in South Africa; an Investigation into Phase Differences,
W74-02909 2A

FRACTIONATION
Fractionation and Characterization of Natural Organic Matter from Certain Rivers and Soils by Free-Flow Electrophoresis,
W74-03062 2K

FRACTURE TRACES
Random Drilling for Water in Carbonate Rocks,
W74-03141 8B

FRASER RIVER
Sedimentation on the Western Delta-Front of the Fraser River, British Columbia,
W74-03061 2L

FRESHWATER FISH
Water Quality Criteria for European Freshwater Fish. Reoprt on Ammonia and Inland Fisheries.
W74-02951 5C

FUELS
Environmental Challenges and Nuclear Fuels,
W74-02892 5B

FULVIC ACIDS
Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

FUNGI
Lower Fungi as Test Organisms of Pollutants in Sea and Brackish Water: The Effects of Heavy Metal Compounds and Phenol on Thraustochytrium striatum (In German),
W74-02696 5C

FURFURAL
Determination of Furfural in Water and Asphalt (In Polish),
W74-02798 5A

FUTURE PLANNING (PROJECTED)
Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania; Volume I--General, Sewerage Planning, Appendices.
W74-02861 6E

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania: Volume 2--Water Planning.
W74-02862 6E

GAGING STATIONS
Surface Water Supply of the United States, 1966-70--Part 6. Missouri River Basin: Volume 2. Missouri River Basin from Williston, North Dakota, to Sioux City, Iowa.
W74-03035 7C

GAS VACUOLATION
A Portable Apparatus for Measuring Relative Gas Vacuolation, The Strength of Gas Vacuoles, and Turgor Pressure in Planktonic Blue-Green Algae and Bacteria,
W74-02976 5A

GASOLINE
North Georgia Petroleum Company V. Lewis (Action by Property Owner Seeking Damages for Pollution of Water Supply and by Station Operator Against Gasoline Company for Loss of Profits).
W74-02818 6E

GATES
Efficient Flood Control of Dams Equipped with Crest Gates,
W74-02911 8C

GELS
The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

GEOBOTANICAL PROCESSES
Geobotanical Processes in the Saskatchewan River Delta,
W74-02866 2I

GEOCHEMISTRY
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

GEOGRAPHIC DISTRIBUTION

GEOGRAPHIC DISTRIBUTION
Coastal Storms of the Eastern United States,
W74-03098 2B

GEOGRAPHY
Rivers as Dynamic Systems,
W74-02857 2E

GEOLOGY
Rivers as Dynamic Systems,
W74-02857 2E

GEOMORPHOLOGY
Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

Quantitative Studies of Beach Morphology and Beach Forming Processes,
W74-03104 2J

GEORGIA
Canal Companies.
W74-02804 6E

Southern Mutual Investment Corporation V. Langston (Suit for Damages Resulting from Diversion of Surface Waters).
W74-02807 6E

North Georgia Petroleum Company V. Lewis (Action by Property Owner Seeking Damages for Pollution of Water Supply and by Station Operator Against Gasoline Company for Loss of Profits).
W74-02818 6E

Comprehensive Water and Sewer Study, Hamilton, Walker, and Catoosa Counties, (Book Two).
W74-02833 5D

Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

GEOTECHNICAL PROBLEMS
Pumped Storage Development and Its Environmental Effects.
W74-03144 8B

GEOTHERMAL STUDIES
Stimulation Modes of Geothermal Aquifers,
W74-02876 4B

Effects of Thermal Additions from the Yellowstone Geyser Basins on the Bacteriology of the Firehole River,
W74-02895 5B

GERMANY (LAACHER SEE)
Antidune and Chute and Pool Structures in the Base Surge Deposits of the Laacher See Area, Germany,
W74-03063 2J

GERMANY (LAKE EDEBERG)
The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

GOVERNMENT FINANCE
River Basin Authorizations and Related Water Resource Projects.
W74-02781 4A

GOVERNMENTAL INTERRELATIONS
Drainage Districts in Connection with United States Levees.
W74-02814 6E

GRAVITY WAVES
Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

GRAVITY WELLS
Steady and Unsteady Flow Towards Gravity Wells,
W74-03161 4B

GRAZING
Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

GREATER AND LESSER ANTILLES
Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume II, Bibliography on Marine Biology.
W74-03054 2L

Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume III, Bibliography on Marine Geology and Geophysics.
W74-03055 2L

GRIGGS AND STEELE COUNTIES (ND)
Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

GROUNDFISH
Temperature Trends and the Distribution of Groundfish in Continental Shelf Waters, Nova Scotia to Long Island,
W74-02867 5C

GROUNDWATER
Diversion of Flood Flows from the Connecticut River and the Effect on Groundwater Supplies,
W74-02847 4B

Random Drilling for Water in Carbonate Rocks,
W74-03141 8B

Groundwater Movement,
W74-03142 4B

Ground Water in Thailand,
W74-03150 4B

Designing for Future Expansion-Development of Ground Water in India,
W74-03151 4B

Mutual Interference of Water Wells,
W74-03154 8B

Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

Steady and Unsteady Flow Towards Gravity Wells,
W74-03161 4B

Terradynamics,
W74-03165 8E

Computing the Barometric Efficiency of a Well,
W74-03167 8B

GROUNDWATER FLOW
A Flow Path Ground Water Sampler,
W74-03126 7B

GROUNDWATER MOVEMENT
A Galerkin-Finite Element Simulation of Groundwater Contamination of Long Island, New York,
W74-02772 5B

GROUNDWATER RECHARGE
Solids Waste Disposal.
W74-02840 5D

Diversion of Flood Flows from the Connecticut River and the Effect on Groundwater Supplies,
W74-02847 4B

Hydrodynamics of Artificial Groundwater Recharge (Saturated Flow Theory),
W74-03091 4B

GROUNDWATER RESOURCES
Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

Water Resources of the Ponce Area, Puerto Rico,
W74-03038 4A

Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

Designing for Future Expansion-Development of Ground Water in India,
W74-03151 4B

GROUTING
Sealing Abandoned Water Wells.
W74-03169 8F

GROWTH RATES
Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

GULF
Free Oscillations in the Gulf of Civitavecchia and the Effect of Kinetic Viscosity (Le Oscillazioni Libere Del Golfo Di Civitavecchia E L'azione Della Viscosita Cinematica),
W74-02703 2L

GULF OF MEXICO
Gulf Holding Corp. V. Brazoria County (Order Enjoining Landowner from Obstructing Public Use of Beach).
W74-02805 6E

Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume II, Bibliography on Marine Biology.
W74-03054 2L

Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume III, Bibliography on Marine Geology and Geophysics.
W74-03055 2L

HABITATS
The Realities of Thermal Pollution - Environmental Limitations and Ecological Adaptations,
W74-02870 5C

Natural Habitat of Caryophanon latum,
W74-02966 5B

HARBORS
Wave Induced Oscillations in Harbors,
W74-02708 2L

Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

A Study of Water Circulation in Monterey Harbor Using Rhodamine B Dye,
W74-03114 2L

HAWAII
Annual Report, '71-'72.
W74-03092 5G

Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2J

HAZARDS
The Pollution Potential in Pesticide Manufacturing.
W74-02685 5C

HEAT
The Measurement of the Heat of Reaction Between Proteins and Clay Minerals by Microcalorimetry,
W74-02669 2G

Reversible Heat Injury in the Marine Psychrophilic Bacterium Vibrio marinus MP-1,
W74-02883 5C

Calculation of Heat Transfer in Turbulent Flow with Allowance for Secondary Flow,
W74-02904 8B

Environmental Levels of Radioactivity at Atomic Energy Commission Installations.
W74-03136 5A

HEAT BUDGET
Determination of the Heat Capacity of Lake Kariba,
W74-02910 2H

HEAT FLOW
Computation of the Sensible Heat Flux and Its Relation to Other Components of the Heat Balance at the Surface,
W74-02940 2D

HEAT RESISTANCE
Experimental Ecological Investigations of Chironomus thummi and Chironomus piger (Diptera, Chironomidae). (Experimentell-okologishe Untersuchungen an Chironomus thummi und Chironomus piger (Diptera, Chironomidae),
W74-02963 5C

HEAT TRANSFER
Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

On Generalized Hydrodynamic Equations Used in Heat Transfer Theory,
W74-02880 8B

Heat Transfer Fouling Through Growth of Calcareous Film Deposits,
W74-02882 8G

Turbulent Heat Transfer and the Periodic Viscous Sublayer,
W74-02884 8B

High Reynolds Numbers Unsteady Convective Mass Transfer from Fluid Spheres,
W74-02891 2B

Free Convection Film Condensation of Steam in the Presence of Non-Condensing Gases,
W74-02896 8B

Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

Computation of the Sensible Heat Flux and Its Relation to Other Components of the Heat Balance at the Surface,
W74-02940 2D

HEATED WATER
Calefaction of the Connecticut River, U.S.A.,
W74-02864 5B

Characteristics of Steam Electric Condenser Cooling Waters,
W74-02869 5B

The Realities of Thermal Pollution - Environmental Limitations and Ecological Adaptations,
W74-02870 5C

The Cooling Water of Power Stations: A New Factor in the Environment of Marine and Fresh-Water Invertebrates,
W74-02879 5C

A Statement Prepared for Submission at the Public Hearing on Application Made by Baltimore Gas and Electric Company for a Permit to Appropriate and Use Surface Water for Operation of the Calvert Cliffs Nuclear Power Plant Made to the Maryland Department of Water Resources,
W74-02886 5C

HEATING
Power Plant Effluent - Thermal Pollution or Energy at a Bargain Price,
W74-02888 5B

HEAVY METALS
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

Lower Fungi as Test Organisms of Pollutants in Sea and Brackish Water: The Effects of Heavy Metal Compounds and Phenol on Thraustochytrium striatum (In German),
W74-02696 5C

Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

On the Water Quality of Lake Biwa, The Seta River and some Rivers in Otsu City and the Heavy Metal Content of Bottom Matters of Lake Biwa, (In Japanese),
W74-02935 5B

Occurrence and Behaviour of Heavy Metals in River Deltas, with Special Reference to the Rhine and EMS Rivers,
W74-03034 5B

HEAVY MINERALS
Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

HENNEGUYA-SP
Henneguya Sp. (Sporozoa:Myxosporida) As A Probable Cause of Death of Esox Niger in Brome Lake, Quebec,
W74-03025 2H

HERBICIDES
Differential Tolerance of Six Leguminous Crops to Terbutryne,
W74-02941 3F

Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

HERRINGS
Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

HETEROTROPHIC BACTERIA
The Occurrence of Heterotrophic Bacteria in the Waters of the Ilawa Lakes and Some of Their Physiological and Biochemical Properties,
W74-02931 5C

HETEROTROPHY
Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

HIGHWAYS
Laying Out, Altering and Discontinuing Highways.
W74-03132 6E

HOGAN'S POND (NEWFOUNDLAND)
Plankton Dynamics in a Newfoundland Lake,
W74-02926 5C

HOLE DEVIATION
The Role of Rock Strength Anisotropy in Natural Hole Deviation,
W74-03156 8B

HOT SPRINGS
Survival of Bacteria in Extreme Environments,
W74-02962 5C

HUMBOLDT BAY (CALIF)
Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

HUMBOLDT RIVER BASIN (NEV)
Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

HUMIC ACIDS
Determination of the Association and Dissociation of Humic Acid Fractions by Small Angle X-Ray Scattering,
W74-02730 2K

Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

HUNGARY (LAKE BALATON-LAKE BELSO)
Electron Microscopic Investigation of Natural Bacterial Populations in the Water and Sediment of Lake Balaton and Lake Belso,
W74-02725 5A

HURRICANES
Hurricane Surge Frequency Estimated for the Gulf Coast of Texas,
W74-02700 2L

HYDRAULIC FRACTURING
Feasibility Study: Hydraulic Fracturing of Drilled Water Wells to Stimulate Their Yield,
W74-02659 8B

HYDRAULIC MACHINERY
Deep Well Submersibles are Growing,
W74-03147 8C

HYDRAULIC MODELS
Hydrodynamics of Artificial Groundwater Recharge (Saturated Flow Theory),
W74-03091 4B

HYDRAULIC PROPERTIES
Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

HYDRO-ELECTRIC POWERPLANTS
Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

HYDRODYNAMICS
Breaker Type Classification on Three Laboratory Beaches,
W74-02712 2E

On Generalized Hydrodynamic Equations Used in Heat Transfer Theory,
W74-02880 8B

Hydrodynamics of Artificial Groundwater Recharge (Saturated Flow Theory),
W74-03091 4B

Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

HYDROFOILS
Final Environmental Impact Statement for Modification of a Boat Dock and Ramp.
W74-03124 6G

HYDROGEN ION CONCENTRATION
The Ionic Activity Function of Water and the Activity Coefficient of the Hydrogen Ion in Seawater,
W74-02760 1B

Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

Effect of pH and High Phosphorus Concentrations on Growth of Waterhyacinth,
W74-02934 5C

Water Quality Criteria for European Freshwater Fish. Reoprt on Ammonia and Inland Fisheries.
W74-02951 5C

The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

HYDROGEN SULFIDE
Iron Removal Filter System,
W74-03002 5F

HYDROGEOLOGY
Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

HYDROGRAPHS
Comparison of Methods of Deriving Unit Hydrographs,
W74-02828 2E

HYDROGRAPHY
Hydrography and Water Resources of Australia (Gidrografiya i vodnyye resursy Avstralii),
W74-02757 6B

HYDROLOGIC DATA
Water Resources Data for Colorado, 1972: Part 1. Surface-Water Records.
W74-02724 7C

A Hydrologic Reconnaissance of the Pascagoula River Estuary, Mississippi,
W74-03094 2L

ICE BREAKUP
Protecting Offshore Structures from Ice,
W74-03013 8C

ICE TRENCHING MACHINES
Protecting Offshore Structures from Ice,
W74-03013 8C

IDAHO
Simulation Model for Evaluation of Interception Loss from Forest Trees, Part I. Modeling Snow Interception on Conifers and Part II. Laboratory Modeling of Snow Interception on Trees,
W74-02656 2I

The Idaho System for the Distribution of Water Among Its Appropriators: An Examination and Assessment,
W74-02793 6E

IGNEOUS ROCKS
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

ILAWA LAKES (POLAND)
The Occurrence of Heterotrophic Bacteria in the Waters of the Ilawa Lakes and Some of Their Physiological and Biochemical Properties,
W74-02931 5C

ILLINOIS
Pierce V. De Jong (Action by Owners of Dominant Estate Against Owners of Servient Estate for Damages for Obstruction of Natural Flow of Surface Waters).
W74-02806 6E

Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

IMAGERY
Coastal Imagery Data Bank: Interim Report,
W74-02701 2L

IMAGINES
Observations on Upstream Migration by Imagines of Some Plecoptera and Ephemeroptera,
W74-02967 5B

IMMATURE GROWTH STAGE
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

IMPACT (RAINFALL)
The Role of Rainfall Impact in Soil Detachment and Transport,
W74-02769 2J

IMPERIAL VALLEY (CA.)
Water, Land, and Environment Imperial Valley: Law Caought Up in the Winds of Politics,
W74-03127 6E

IN VITRO TESTS
Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

INCIDENT WAVES
Water Wave Run-Up on a Beach,
W74-02698 2E

INCINERATION
Application and Operation of Sludge Incineration,
W74-02849 5E

Thermolytic Sewage System,
W74-03001 5D

INDIA (KERALA)
The Surface Waters off the Coast of Kerala, South-West India,
W74-03103 2E

NDIA (MAHARASHTRA)
Wells and Welfare. An Exploratory Cost-Benefit Study of the Economics of Small-Scale Irrigation in Maharashtra,
W74-03192 6B

NDIA (UTTAR PRADESH)
Designing for Future Expansion-Development of Ground Water in India,
W74-03151 4B

NDIANA
Water-Works in Cities of Specified Classes of Populations.
W74-02802 6E

Indiana Drainage Code--Drainage Boards--Powers and Duties.
W74-02803 6E

NDONESIA
The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

NDUSTRIAL DISCHARGES
A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

NDUSTRIAL FISHING
A Study of Commercially Important Estuarine-Dependent Industrial Fishes,
W74-02839 6C

NDUSTRIAL WASTE SURCHARGE SSESSMENT
A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

NDUSTRIAL WASTES
Waste Treatment for Small Flows,
W74-02723 5D

U.S. V. Valley Camp Coal Company (Violation of Federal Statute Prohibiting Discharge of Refuse Matter into Navigable Waters).
W74-02810 6E

A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

Lake Michigan Discharge Studies.
W74-02954 5B

A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

Effect of Hydrolysis Plant Effluents on Fish (Vliyanne na ryb stochnykh vod gidroliznogo zavoda),
W74-03074 5C

Effluent Treatment Plants in the Forest Products Industry (Puunjalostusteollisuuden jatevesipuhdistamot),
W74-03087 5D

FILTRATION
Flow Characteristics of a Subsurface-Controlled Recharge Basin on Long Island, New York,
W74-02734 4B

Hydrodynamics of Laminar Flow Over a Porous Bed,
W74-02770 2E

INFORMATION CENTERS
National Environmental Information Symposium: An Agenda for Progress--Papers and Reports, Volume 2.
W74-03040 10B

A Survey of the Biological-Science-Related Information Centers Listed in the Sequip Report,
W74-03041 10D

Information Centers Concerned with Environmental Matters: Physical Science and Technology,
W74-03042 10D

Federal Environmental Data Centers and Systems,
W74-03043 10D

INFORMATION EXCHANGE
National Environmental Information Symposium: An Agenda for Progress--Papers and Reports, Volume 2.
W74-03040 10B

A Survey of the Biological-Science-Related Information Centers Listed in the Sequip Report,
W74-03041 10D

Information Centers Concerned with Environmental Matters: Physical Science and Technology,
W74-03042 10D

Federal Environmental Data Centers and Systems,
W74-03043 10D

Technical and Scientific Journals,
W74-03045 10C

Document Services,
W74-03046 10C

Referral Activities and Other Non-Bibliographic Information Services,
W74-03047 10B

Introduction to Legal, Legislative and Regulatory Session of National Environmental Protection Symposium,
W74-03048 10B

Environmental Law Information System,
W74-03049 10B

Legal Bibliography: A Critical Overview,
W74-03050 10C

Document Services and Referral Activities in the Legal, Legislative, and Regulatory Area,
W74-03051 10B

Document Services and Referral Activities in Industry and the Federal Government,
W74-03052 10B

INFORMATION RETRIEVAL
Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

INFORMATION SERVICES
Referral Activities and Other Non-Bibliographic Information Services,
W74-03047 10B

INHABITION
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

INLETS
Chincoteague Inlet, Navigation Project, Accomack County, Virginia (Final Environmental Statement).
W74-02800 8A

INPUT-OUTPUT ANALYSIS
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

INSECT MORPHOLOGY
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

INSTITUTIONS
Water Quality Management: New Jersey's Vanishing Options.
W74-02841 5G

Institutional Problems in the Water Resources Field,
W74-03183 6B

A Challenge to the Academic Community: Economics and Institutions in the Report of the National Water Commission,
W74-03184 6B

INSTRUMENTATION
A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

Instrumental Analysis of Chemical Pollutants--Training Manual.
W74-02739 5A

The Denver System of Controls,
W74-02854 5F

INTER-STATE WATER TRANSFER
Oregon's Long-Range Requirements for Water.
W74-03119 6D

INTERCEPTION
Simulation Model for Evaluation of Interception Loss from Forest Trees, Part I. Modeling Snow Interception on Conifers and Part II. Laboratory Modeling of Snow Interception on Trees,
W74-02656 2I

A Study of Evapotranspiration from a Douglas Fir Forest Using the Energy Balance Approach,
W74-02764 2D

Fog Drip from Artificial Leaves in a Fog Wind Tunnel,
W74-02765 2I

INTERNATIONAL LAW
Evolution of the Law of the Seas--Destruction of the Pristine Nature of Basic Oceanographic Research,
W74-02791 6E

Marine Protection, Research, and Sanctuaries Act of 1972.
W74-02797 6E

INTERNATIONAL WATERS
The 200 Miles Fishing Rights Controversy: Ecology or High Tariffs,
W74-03200 6E

INVESTIGATIONS
Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

INVESTIGATORS MANUAL
U. S. Coast Guard Oil Pollution Investigation and Control School, Investigator's Manual.
W74-03027 5G

INVESTMENT
The Economic Effects of Floods. Investigations of a Stochastic Model of Rational Investment Behavior in the Face of Floods,
W74-03193 6A

Optimal Investment Orders Under Uncertainty and Dynamic Costs: Theory and Estimates,
W74-03199 6B

ION EXCHANGE
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

ION SELECTIVE ELECTRODES
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

IONIZATION
The Ionic Activity Function of Water and the Activity Coefficient of the Hydrogen Ion in Seawater,
W74-02760 1B

Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

IOWA
Plant Species as Wildlife Cover and Erosion Control on 'Mudflats' in Iowa's Lareg Reservoir Systems,
W74-02666 4D

Public Use of Private Lands and Waters.
W74-02812 6E

Rural Water Districts.
W74-02813 6E

Drainage Districts in Connection with United States Levees.
W74-02814 6E

Population Studies of Bigmouth Buffalo in Coralville Reservoir with Special Reference to Commercial Harvest,
W74-03036 8I

IRON
The Effect of Ethylenediaminetetraacetic Acid on the Growth of Chlorella Pyrenoidosa and Its Role in the Dynamics of Metabolism and Accessibility of Iron and Calcium,
W74-02925 5C

Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

Iron Removal Filter System,
W74-03002 5F

IRRIGATION
Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

Water, Land, and Environment Imperial Valley: Law Caought Up in the Winds of Politics,
W74-03127 6E

IRRIGATION EFFECTS
Loss of Nitrogen from Various Nitrogen Fertilizers on Irrigated Land,
W74-02936 3F

IRRIGATION EFFICIENCY
Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

IRRIGATION PRACTICES
Water Requirements of Various Crops in Arid and Semi-Arid Zones of Turkey,
W74-02937 3F

IRRIGATION WATER
Economic Policy for Water Resources and Placement Flows,
W74-03191 4B

Reuse Irrigation Cuts Costs,
W74-03194 5D

IRRIGATION WELLS
Wells and Welfare. An Exploratory Cost-Benefit Study of the Economics of Small-Scale Irrigation in Maharashtra,
W74-03192 6B

ISOLATION
Natural Habitat of Caryophanon latum,
W74-02966 5B

Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

Escherichia coli Serogroups Isolated from Streams in Pennsylvania, 1965 to 1972,
W74-02988 5A

ISRAEL
Computation of the Sensible Heat Flux and Its Relation to Other Components of the Heat Balance at the Surface,
W74-02940 2D

ITALY (GULF OF CIVITAVECCHAI)
Free Oscillations in the Gulf of Civitavecchia and the Effect of Kinetic Viscosity (Le Oscillazioni Libere Del Golfo Di Civitavecchia E L'azione Della Viscosita Cinematica),
W74-02703 2L

JACKING
The Jacking Method in Tunnel Construction,
W74-02855 8A

JAPAN
Odonata of Sugadaira and Vicinity,
W74-02783 2I

JAPAN COAST
Deformation of Temporal Pattern of Orbital Wave Velocity and Sediment Transport in Shoaling Water, In Breaker Zone and on Foreshore,
W74-02711 2L

JAPAN (KASAOKA BAY)
An Ecological Study on the So-Called Moga (Anadara subcrenata (Lischke)) Cultured in the Kasaoka Bay (In Japanese),
W74-02690 5C

JAPAN (LAKE BIWA)
On the Water Quality of Lake Biwa, The Seta River and some Rivers in Otsu City and the Heavy Metal Content of Bottom Matters o Lake Biwa, (In Japanese),
W74-02935 5E

JET ENTRAINMENT
Chesapeake Bay Model Study for Calver Cliffs,
W74-02905 5E

JETS
Disposal of Brine into An Estuary,
W74-02735 5E

JUDICIAL DECISION
Pierce V. De Jong (Action by Owners of Domi nant Estate Against Owners of Servient Estat for Damages for Obstruction of Natural Flo of Surface Waters).
W74-02806 6E

Southern Mutual Investment Corporation V Langston (Suit for Damages Resulting fro Diversion of Surface Waters).
W74-02807 6E

Harthman V. Witty (Appeal from District Cou Order Denying Motion for Assessment o Damages Against Shopping Center for Viola tion of Injunction Against Pollution of Stream)
W74-02809 6E

U.S. V. Valley Camp Coal Company (Violatio of Federal Statute Prohibiting Discharge o Refuse Matter into Navigable Waters).
W74-02810 6E

JUDICIAL DECISIONS
Gulf Holding Corp. V. Brazoria County (Orde Enjoining Landowner from Obstructing Publi Use of Beach).
W74-02805 6E

Clemson University V. First Provident Co poration (Suit to Enjoin Trespass Upon Se vient Lands).
W74-02808 6E

Red Hook Marina Corporation V. Antille Yachting Corporation (Action to Recover Un paid Balance on Note and to Foreclos Purchase Money Mortgage).
W74-02811 6E

JUNIPER TREES
Small Mammals Increase on Recently Cleare and Seeded Juniper Rangeland,
W74-02938 4A

KARST
Karst Waters of the Caucasus (Karstovyy vody Bol'shogo Kavkaza),
W74-02756 2E

KARST HYDROLOGY
Karst Waters of the Caucasus (Karstovyye vody Bol'shogo Kavkaza),
W74-02756 2E

KAUAI (HAWAII)
Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2J

KELVIN WAVES
On the Mean Drift in Large Lakes,
W74-02762 2H

KENTUCKY
United States V. Kentland-Elkhorn Coal Corporation (Injunctive Relief Sought Against Defendant to Cause Cessation of Blackwater Discharge into Federally protected Waters).
W74-02815 6E

Flood Plain Information for Harris Fork Creek and South Fulton Branch, Fulton, Kentucky and South Fulton, Tennessee.
W74-03125 4A

KINETICS
Catalytic Oxidation of Organics in Wastewater,
W74-02655 5D

Free Oscillations in the Gulf of Civitavecchia and the Effect of Kinetic Viscosity (Le Oscillazioni Libere Del Golfo Di Civitavecchia E L'azione Della Viscosita Cinematica),
W74-02703 2L

Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

LABORATORY TESTS
Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

LAGOONS
Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

LAKE CHUBSUCKER
Isoglaridacris agminis sp. n. (Cestoda: Caryophyllaeidae) from the Lake Chubsucker, Erimyzon sucetta (Lacepede),
W74-03097 2I

LAKE CIRCULATION
On the Mean Drift in Large Lakes,
W74-02762 2H

LAKE ICE
Protecting Offshore Structures from Ice,
W74-03013 8C

LAKE ISSYK-KUL'
A Morphometric Description of Lake Issyk-Kul' (Morformetricheskaya kharakteristika ozera Issyk-Kul'),
W74-02755 2H

LAKE KARIBA
Determination of the Heat Capacity of Lake Kariba,
W74-02910 2H

LAKE MENDOTA (WIS)
Nitrogen Fixation in Lake Sediments: A Contribution to Nitrogen Budget of Lake Mendota,
W74-02924 5C

LAKE MICHIGAN
Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

LAKE MORPHOMETRY
A Morphometric Description of Lake Issyk-Kul' (Morformetricheskaya kharakteristika ozera Issyk-Kul'),
W74-02755 2H

LAKE NOQUEBAY (WIS)
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

LAKE REHABILITATION
A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

LAKE SEDIMENTS
Electron Microscopic Investigation of Natural Bacterial Populations in the Water and Sediment of Lake Balaton and Lake Belso,
W74-02725 5A

The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

LAKE WASHINGTON (WASH.)
Final Environmental Impact Statement for Modification of a Boat Dock and Ramp.
W74-03124 6G

LAKE WEROWRAP (VICTORIA)
Studies on a Saline Lake Ecosystem,
W74-02920 5C

LAKES
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

Surface Circulation of Lakes and Nearly Land-Locked Seas,
W74-02715 2H

The Influence of Dissolved Humic Substances on Trace Metal Phototoxicity,
W74-02727 2H

Electrochemical Measurement of Zinc in Organic-Rich Water,
W74-02729 2H

Construction of a Map of Average Annual Runoff for North Kazakhstan (Postroyeniye karty normy stoka Severnogo Kazakhstana),
W74-02751 2E

A Morphometric Description of Lake Issyk-Kul' (Morformetricheskaya kharakteristika ozera Issyk-Kul'),
W74-02755 2H

On the Mean Drift in Large Lakes,
W74-02762 2H

Nitrogen Fixation in Lake Sediments: A Contribution to Nitrogen Budget of Lake Mendota,
W74-02924 5C

Plankton Dynamics in a Newfoundland Lake,
W74-02926 5C

The Occurrence of Heterotrophic Bacteria in the Waters of the Ilawa Lakes and Some of Their Physiological and Biochemical Properties,
W74-02931 5C

LAMINAR CONVECTION
Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

LAMINAR FLOW
Turbulent Heat Transfer and the Periodic Viscous Sublayer,
W74-02884 8B

LAND APPRAISALS
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

LAND DEVELOPMENT
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

LAND MANAGEMENT
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

Pothole Community Management for Livestock and Wildlife in the Intermountain Region,
W74-03083 4A

LAND TENURE
Gulf Holding Corp. V. Brazoria County (Order Enjoining Landowner from Obstructing Public Use of Beach).
W74-02805 6E

LAND USE
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

Flood Control Project Planning by Mathematical Programming: A Project-Expansion Approach,
W74-02674 4A

Lower Wisconsin River Valley Soil Resources and Use Potentials,
W74-02957 4A

Land Use and Water Resources,
W74-03024 2A

Minnesota Natural Resource Information System,
W74-03053 10B

Flood Plain Information for Harris Fork Creek and South Fulton Branch, Fulton, Kentucky and South Fulton, Tennessee.
W74-03125 4A

LAOS
Pa Mong Stage one Feasibility Report. Appendix VI. Economic, Agricultural, Social and Financial Analysis.
W74-02686 6B

Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

LARVAE
Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

LARVAL
Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

LARVAL FISH SURVEY
Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

LAS VEGAS VALLEY
Master Water Plan, Las Vegas Valley, (With Map Supplement).
W74-03117 6D

LAS VEGAS VALLEY (NEV.)
Environmental Assessment; Pollution Abatement Project, Las Vegas Wash and Bay, Annex B.
W74-03118 5D

LAS VEGAS VALLEY WASH AND BAY
Environmental Assessment; Pollution Abatement Project, Las Vegas Wash and Bay, Annex B.
W74-03118 5D

LAS VEGAS WASH AND BAY (NEV.)
Evaluation of Alternates for Water Pollution Control and Resource Management: Phase III, Pollution Abatement Project, Las Vegas Wash and Bay, Annex C.
W74-02834 5D

LAW OF THE SEA
Evolution of the Law of the Seas--Destruction of the Pristine Nature of Basic Oceanographic Research,
W74-02791 6E

LEACHING LOSSES
Optimal Control of Nitrogen Losses from Land Disposal Areas,
W74-02677 5B

LEAKY ARTESIAN AQUIFERS
Drawdown Distribution Due to Well Fields in Coupled in Coupled Leaky Aquifers, 1. Infinite Aquifer System,
W74-02773 2F

LEAVES
Fog Drip from Artificial Leaves in a Fog Wind Tunnel,
W74-02765 2I

LEGAL ASPECT
Document Services and Referral Activities in the Legal, Legislative, and Regulatory Area,
W74-03051 10B

LEGAL ASPECTS
Implementation of the Federal Water Pollution Control Act.
W74-02782 6E

The Rise and Fall of Natural Resource Systems,
W74-02786 6E

Evolution of the Law of the Seas--Destruction of the Pristine Nature of Basic Oceanographic Research,
W74-02791 6E

Federally Reserved Rights to Underground Water-A Rising Question in the Arid West,
W74-02792 6E

Water Pollution--The Tennessee Response; Conclusions and Generalizations,
W74-02794 6E

Summary of Legislative and Regulatory Activities Affecting the Environmental Quality of Nuclear Facilities.
W74-02890 5G

Introduction to Legal, Legislative and Regulatory Session of National Environmental Protection Symposium,
W74-03048 10B

Environmental Law Information System,
W74-03049 10B

Legal Bibliography: A Critical Overview,
W74-03050 10C

LEGISLATION
Implementation of the Federal Water Pollution Control Act.
W74-02782 6E

The Federal Water Pollution Control Act Amendments of 1972.
W74-02785 6E

Missouri Clean Water Law.
W74-02787 6E

A Bill to Establishment The Missouri Breaks Scenic Recreation River in the State of Montana.
W74-02788 6E

A Bill to Authorize the Secretary of the Army to Investigate, Plan, and Construct Projects for the Control of Streambank Erosion.
W74-02789 6E

A Bill to Authorize the Secretary of the Interior to Study the Feasibility and Desirability of a Boston Harbor National Recreation Area in the State of Massachusetts.
W74-02790 6E

Water Pollution--The Tennessee Response; Conclusions and Generalizations,
W74-02794 6E

Federal Legislation Regarding Marine Pollution,
W74-02795 6E

Civil Liability of Shipowners for Oil Pollution,
W74-02796 6E

Marine Protection, Research, and Sanctuaries Act of 1972.
W74-02797 6E

The Proposed International Compensation Fund for Oil Pollution Damage,
W74-02799 6E

Water-Works in Cities of Specified Classes of Populations.
W74-02802 6E

Indiana Drainage Code--Drainage Boards--Powers and Duties.
W74-02803 6E

Canal Companies.
W74-02804 6E

Drainage Districts.
W74-02816 6E

Lake Skaneateles--Sewage, Garbage Dumping Prohibited.
W74-02817 6E

Water Quality Management: New Jersey's Vanishing Options.
W74-02841 5G

Summary of Legislative and Regulatory Activities Affecting the Environmental Quality of Nuclear Facilities.
W74-02890 5G

What About Water.
W74-03135 6E

A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

LEGUMES
Differential Tolerance of Six Leguminous Crops to Terbutryne,
W74-02941 3F

LEHIGH COUNTY (PENNSYLVANIA)
Water Supply and Sewage Facilities Plan Update--1970, Lehigh-Northampton Counties, Pennsylvania.
W74-02848 5D

4 Water Pollution, Environmental Enhancement Study.
W74-02856 5G

LEMNA-TRISULCA
Higher Water Vegetation and Its Fauna of Krotowaya Laga and Kusgan Lakes (North Kulanda), (In Russian),
W74-02901 2H

LETHAL LIMIT
Observations on the Reactions of Young American Shad to a Heated Effluent,
W74-02900 5C

LEVEE DISTRICT
Drainage Districts in Connection with United States Levees.
W74-02814 6E

LEVEES
Baylands Salt Water Flood Control Planning Study.
W74-02829 4A

LIBRARY OF CONGRESS
Introduction to Legal, Legislative and Regulatory Session of National Environmental Protection Symposium,
W74-03048 10B

LIFE CYCLES
Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

LIGHT QUALITY
Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium

Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophylliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

LIGNINS
Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

LIGNOSULFONATES
The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

LIME
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

Color Removal and Sludge Recovery from Total Mill Effluent,
W74-03077 5D

LIMITING FACTORS
Environmental Assessment; Pollution Abatement Project, Las Vegas Wash and Bay, Annex B.
W74-03118 5D

LIMNOLOGY
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

Acton Lake: Biology of Its Benthos and Notes on Its Physical Limnology 1959-1970,
W74-03066 2H

LINEAR PROGRAMMING
Flood Control Project Planning by Mathematical Programming: A Project-Expansion Approach,
W74-02674 4A

Optimal Control of Nitrogen Losses from Land Disposal Areas,
W74-02677 5B

Design Optimization for Biological Filter Models,
W74-02679 5D

LIPOLYTIC BACTERIA
Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

LIQUID WASTES
Total Dissolved Electrolyte Effects on Periphyton,
W74-02990 5C

Continuously Regenerating Active Earth Filtering Apparatus for Liquid wastes,
W74-03004 5D

The Liquid Waste Facilities Function Concept.
W74-03039 5D

LITTORAL
Littoral Fauna Along the NW Coast of the Sea of Japan,
W74-02691 2L

The Southern Monterey Bay Littoral Cell: A Preliminary Sediment Budget Study,
W74-02695 2L

Gulf Holding Corp. V. Brazoria County (Order Enjoining Landowner from Obstructing Public Use of Beach).
W74-02805 6E

Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2J

LIVESTOCK
Pothole Community Management for Livestock and Wildlife in the Intermountain Region,
W74-03083 4A

LOCAL GOVERNMENTS
A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

LONG-TERM PLANNING
Water Supply and Sewage Facilities Plan Update--1970, Lehigh-Northampton Counties, Pennsylvania.
W74-02848 5D

The Legal and Regulatory Framework for Thermal Discharge from Nuclear Power Plants,
W74-02875 5G

LONGSHORE DRIFT
Equilibrium Shapes of Coastline in Plan,
W74-03105 2J

LONGSHORE TRANSPORT
Longshore Transport of Sand,
W74-02706 2J

LOUISIANA
Drainage Districts.
W74-02816 6E

A Study of Commercially Important Estuarine-Dependent Industrial Fishes,
W74-02839 6C

Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

LOVEGRASS
The Seasonal Growth of Lovegrass (Eragrostis Curvula) on Deep Sandy Soils In A Semi-Arid Environment,
W74-02942 3F

LOW FLOW
Role of Depth of Channel Downcutting in the Formation of Low Flow in Mountain Streams (Rol' glubiny vreza rusel v formirovanii mazhennogo stoka gornykh rek),
W74-02753 2E

Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

LUMBER HARVESTING
Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities.
W74-02946 5G

LUZERNE COUNTY (PENNSYLVANIA)
Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania; Volume I--General, Sewerage Planning, Appendices.
W74-02861 6E

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania: Volume 2--Water Planning.
W74-02862 6E

LYSIMETERS
Unsaturated Flow Properties Used to Predict Outflow and Evapotranspiration from a Sloping Lysimeter,
W74-02771 2D

Snowmelt Lysimeters Perform Well in Cold Temperatures in Central Colorado,
W74-03067 2C

MAGNETIC SUSCEPTIBILITY
Magnetic Susceptibility of the Excess Temporary Moistening of Soils, (in Russian),
W74-02877 2G

MAGNETITE
Oil Removal from Waste Waters,
W74-03020 5D

MAGNETOHYDRODYNAMICS
MHD Central Power: A Status Report,
W74-02871 5B

MAINE
Laying Out, Altering and Discontinuing Highways.
W74-03132 6E

MANAGEMENT
A Water Quality Simulation Model,
W74-02683 5B

Economic and Political Objectives in Fishery Management,
W74-03195 6B

MANGANESE
Iron Removal Filter System,
W74-03002 5F

MAPS
Construction of a Map of Average Annual Runoff for North Kazakhstan (Postroyeniye karty normy stoka Severnogo Kazakhstana),
W74-02751 2E

MARGINAL ANALYSIS
Development of a Marginal Analysis Capability for Water Resources Simulation Models,
W74-02682 4A

MARINE ANIMALS
The Cooling Water of Power Stations: A New Factor in the Environment of Marine and Fresh-Water Invertebrates,
W74-02879 5C

The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

MARINE BACTERIA
Reversible Heat Injury in the Marine Psychrophilic Bacterium Vibrio marinus MP-1,
W74-02883 5C

Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

MARINE BIOLOGY
Littoral Fauna Along the NW Coast of the Sea of Japan,
W74-02691 2L

Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume II, Bibliography on Marine Biology.
W74-03054 2L

Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume III, Bibliography on Marine Geology and Geophysics.
W74-03055 2L

MARINE ENVIRONMENT
Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

MARINE FISH
Temperature Trends and the Distribution of Groundfish in Continental Shelf Waters, Nova Scotia to Long Island,
W74-02867 5C

MARINE FISHERIES
The 200 Miles Fishing Rights Controversy: Ecology or High Tariffs,
W74-03200 6E

MARKOV PROCESSES
Development of a Marginal Analysis Capability for Water Resources Simulation Models,
W74-02682 4A

MARSHES
Mechanisms Controlling Pore Water Salinities in a Salt Marsh,
W74-02761 2K

Drainage Districts.
W74-02816 6E

MARYLAND
An Overview of Maryland's Sediment Control Program,
W74-02852 5G

MASS TRANSFER
High Reynolds Numbers Unsteady Convective Mass Transfer from Fluid Spheres,
W74-02891 2B

MASS TRANSPORT
Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

MASSACHUSETTS
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

A Bill to Authorize the Secretary of the Interior to Study the Feasibility and Desirability of a Boston Harbor National Recreation Area in the State of Massachusetts.
W74-02790 6E

MATHEMATICAL MODELS
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

Optimal Control of Nitrogen Losses from Land Disposal Areas,
W74-02677 5B

On Generalized Hydrodynamic Equations Used in Heat Transfer Theory,
W74-02880 8B

Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

Calculation of Heat Transfer in Turbulent Flow with Allowance for Secondary Flow,
W74-02904 8B

A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

Unsteady Flow in Sewer Networks,
W74-03095 5D

Calculation of a Solitary Wave Shoaling on a Shallow Slope,
W74-03115 8B

Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

A Forecasting Model Applied to Pollution Control Costs,
W74-03189 5G

MATHEMATICAL STUDIES
Optimal Investment Orders Under Uncertainty and Dynamic Costs: Theory and Estimates,
W74-03199 6B

MATURE GROWTH STAGE
Observations on Upstream Migration by Imagines of Some Plecoptera and Ephemeroptera,
W74-02967 5B

MAYFLIES
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

MEASUREMENT
A Morphometric Description of Lake Issyk-Kul' (Morformetricheskaya kharakteristika ozera Issyk-Kul'),
W74-02755 2H

Temperature of Missouri Streams,
W74-02885 2K

Atmospheric Reaeration Capacity of Streams. Part II. Direct Measurement of the Atmospheric Reaeration Rate Constant in the Upper Raritan River Basin,
W74-02917 5C

MECHANICAL EQUIPMENT
A Portable Apparatus for Measuring Relative Gas Vacuolation, The Strength of Gas Vacuoles, and Turgor Pressure in Planktonic Blue-Green Algae and Bacteria,
W74-02976 5A

MEKONG RIVER (PA MONG PROJECT)
Pa Mong Stage one Feasibility Report. Appendix VI. Economic, Agricultural, Social and Financial Analysis.
W74-02686 6B

Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

MEMBRANE FILTERS
Method for the Selective Enumeration of Blue-Green Bacteria in Water,
W74-02974 5A

MEMBRANES
Dynamics Reverse Osmosis Membranes of Ultrathin Discs,
W74-03009 3A

MERCURY
Occurrence and Behaviour of Heavy Metals in River Deltas, with Special Reference to the Rhine and EMS Rivers,
W74-03034 5B

Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

METABOLISM
Reversible Heat Injury in the Marine Psychrophilic Bacterium Vibrio marinus MP-1,
W74-02883 5C

The Effect of Ethylenediaminetetraacetic Acid on the Growth of Chlorella Pyrenoidosa and Its Role in the Dynamics of Metabolism and Accessibility of Iron and Calcium,
W74-02925 5C

METES AND BOUNDS
Red Hook Marina Corporation V. Antilles Yachting Corporation (Action to Recover Unpaid Balance on Note and to Foreclose Purchase Money Mortgage).
W74-02811 6E

METHOD VALIDATION
Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

METHODOLOGY
Flood Control Project Planning by Mathematical Programming: A Project-Expansion Approach,
W74-02674 4A

MEXICO (BAJA CALIFORNIA)
Coastal Sand Dunes of Guerrero Negro, Baja California, Mexico,
W74-02704 2L

MICHIGAN
The Muskegon County Plan of Waste Water Reuse.
W74-02846 5D

Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

MICROBIAL DEGRADATION
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

MICROBIT DRILLING
Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

MICROCLIMATOLOGY
Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

MICROMETEOROLOGY
Computation of the Sensible Heat Flux and Its Relation to Other Components of the Heat Balance at the Surface,
W74-02940 2D

MIGRATION PATTERNS
Observations on Upstream Migration by Imagines of Some Plecoptera and Ephemeroptera,
W74-02967 5B

MILLED-CUTTER BITS
The Role of Rock Strength Anisotropy in Natural Hole Deviation,
W74-03156 8B

MINE DRAINAGE
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

MINNESOTA
Minnesota Natural Resource Information System,
W74-03053 10B

MINNOWS
Variation in Results of Identical Bioassays of Minnows Subjected to Instant Temperature Increase,
W74-02898 5C

MISSISSIPPI
A Hydrologic Reconnaissance of the Pascagoula River Estuary, Mississippi,
W74-03094 2L

MISSOURI
Missouri Clean Water Law.
W74-02787 6E

Temperature of Missouri Streams,
W74-02885 2K

MISSOURI RIVER
Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

Surface Water Supply of the United States, 1966-70--Part 6. Missouri River Basin: Volume 2. Missouri River Basin from Williston, North Dakota, to Sioux City, Iowa.
W74-03035 7C

MISSOURI RIVER BASIN
Surface Water Supply of the United States, 1966-70--Part 6. Missouri River Basin: Volume 2. Missouri River Basin from Williston, North Dakota, to Sioux City, Iowa.
W74-03035 7C

MIXING
First Experimental Results on the Diffusion of Fresh Water in a shallow bay,
W74-03100 2L

Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

MOBILE BAY (ALA)
Permit Application by Radcliff Materials, Inc.--Dredging of Dead-Reef Shells, Mobile Bay, Alabama (Final Environmental Statement). 21Available NTIS, Springfield, Va. 22151 as EIS-AL-73-0542-F, Price $12.00 printed copy. February 1973. 187 p, 44 ref.
W74-02737 6G

MODEL STUDIES
A Numerical Model of Coastal Upwelling,
W74-02713 2E

Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume I, Time Series Analysis in Water Quality Modeling,
W74-02823 5B

Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume II, Nonlinear Filtration and Estimation in Water Quality Modeling,
W74-02824 5B

Chesapeake Bay Model Study for Calvert Cliffs,
W74-02905 5B

MODEL TOWNS
Power Plant Effluent - Thermal Pollution or Energy at a Bargain Price,
W74-02888 5B

MOISTURE STRESS
Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

MONITORING
Statistical Analysis of Biological Data from Preoperational-Postoperational Industrial Water Quality Monitoring,
W74-02993 5A

MONOMOLECULAR FILMS
Evaporation Retardation by Monolayers,
W74-02774 3B

MONSOONS
The Surface Waters off the Coast of Kerala, South-West India,
W74-03103 2E

MONTANA
A Bill to Establishment The Missouri Breaks Scenic Recreation River in the State of Montana.
W74-02788 6E

MONTEREY BAY (CALIF)
Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

The Southern Monterey Bay Littoral Cell: A Preliminary Sediment Budget Study,
W74-02695 2L

MORPHOLOGY
Partitioning of the Estuarine Environment by Two Species of Cancer,
W74-02717 2L

MORTALITY
Reversible Heat Injury in the Marine Psychrophilic Bacterium Vibrio marinus MP-1,
W74-02883 5C

MOUNTAINS
Role of Depth of Channel Downcutting in the Formation of Low Flow in Mountain Streams (Rol' glubiny vreza rusel v formirovanii mazhennogo stoka gornykh rek),
W74-02753 2E

Karst Waters of the Caucasus (Karstovyye vody Bol'shogo Kavkaza),
W74-02756 2E

MUD
Mud in the North Sea,
W74-03031 2J

Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

Easier, More Exact Method Speeds Annulus Pressure-Loss Calculations,
W74-03162 8G

MUD THINNERS
The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

MUDFLATS
Plant Species as Wildlife Cover and Erosion Control on 'Mudflats' in Iowa's Lareg Reservoir Systems,
W74-02666 4D

MUDFLOWS
Mudflow Properties and Patterns (O svoystvakh i zakonomernostyakh selevykh potokov),
W74-02750 2J

MULTI-DISCIPLINARY STUDIES
Regional Planning for Sewerage Systems,
W74-02860 6A

MULTIOBJECTIVE PLANNING
Multigoal Water Quality Planning Model,
W74-02678 5B

MULTIPLE HEARTH FURNANCE
Application and Operation of Sludge Incineration,
W74-02849 5E

MULTIPLE-PURPOSE RESERVOIRS
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

MULTIPLEXERS
Guide to Selecting Digital Multiplexers,
W74-02983 7C

MUNICIPAL WASTES
Waste Treatment for Small Flows,
W74-02723 5D

MUSKEGON COUNTY (MICH.)
The Muskegon County Plan of Waste Water Reuse.
W74-02846 5D

MUSSELS
Biochemical Effects of Temperature and Nutritive Stress on Mytilus edulis L,
W74-02873 5C

MYRIOPHYLLUM HETEROPLYLLUM
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

MYXOBACTERIA (PATHOGENIC)
Studies on Selected Myxobacteria Pathogenic for Fishes and on Bacterial Gill Disease in Hatchery-Reared Salmonids,
W74-02672 5C

NARRAGANSETT BAY (R.I.)
Partitioning of the Estuarine Environment by Two Species of Cancer,
W74-02717 2L

NATIONAL PARKS
A Bill to Authorize the Secretary of the Interior to Study the Feasibility and Desirability of a Boston Harbor National Recreation Area in the State of Massachusetts.
W74-02790 6E

NATIONAL RECLAMATION ACT (1902)
Water, Land, and Environment Imperial Valley: Law Caought Up in the Winds of Politics,
W74-03127 6E

NATIONAL TECHNICAL INFORMATION SERVICE
Document Services,
W74-03046 10C

NATIONAL WATER COMMISSION
The University and Public Policy in Water Resources, Proceedings UCOWR Annual Meeting held July 29-August 1, 1973 at Texas Tech University, Lubbock, Texas.
W74-03172 6B

Implications of the National Water Commission Report for the Universities Council on Water Resources,
W74-03173 6B

Comments on the Report of the National Water Commission,
W74-03174 6B

Social and Economic Impact on Urban Areas of 'Water Policies for the Future,' the National Water Commission Report,
W74-03177 6B

Policy Issues Related to Urbanization,
W74-03178 6B

Water Quality Issues in the National Water Commission's Report 'Water Policies for the Future',
W74-03179 6B

Implications of Selected National Water Commission Recommendations to Agricultural Policy,
W74-03181 6B

Water Resources Policy Issues Related to Agriculture,
W74-03182 6B

Institutional Problems in the Water Resources Field,
W74-03183 6B

A Challenge to the Academic Community: Economics and Institutions in the Report of the National Water Commission,
W74-03184 6B

NATURAL FLOW DOCTRINE
Pierce V. De Jong (Action by Owners of Dominant Estate Against Owners of Servient Estate for Damages for Obstruction of Natural Flow of Surface Waters).
W74-02806 6E

NATURAL RESOURCES
The Rise and Fall of Natural Resource Systems,
W74-02786 6E

NAVIGABLE WATERS
U.S. V. Valley Camp Coal Company (Violation of Federal Statute Prohibiting Discharge of Refuse Matter into Navigable Waters).
W74-02810 6E

A Bill to Amend the Act of March 3, 1899, Commonly Referred to as the Refuse Act Relating to the Issuance of Certain Permits.
W74-03134 6E

NEMATODES
Soil Type, Moisture, Temperature and the Longevity of a Nematode Species of the Genus Tylenchorhynchus in the Absence of Plants,
W74-02719 2I

NEUTRALIZATION
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

NEVADA
Evaluation of Alternates for Water Pollution Control and Resource Management: Phase III, Pollution Abatement Project, Las Vegas Wash and Bay, Annex C.
W74-02834 5D

Master Water Plan, Las Vegas Valley, (With Map Supplement).
W74-03117 6D

Environmental Assessment; Pollution Abatement Project, Las Vegas Wash and Bay, Annex B.
W74-03118 5D

Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

NEW JERSEY
Disposal of Waste Materials at Sea.
W74-02819 6E

Water Quality Management: New Jersey's Vanishing Options.
W74-02841 5G

NEW MEXICO
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

Pollution Abatement Project, Bandelier National Monument, New Mexico (Final Environmental Impact Statement).
W74-02801 5D

Eagle Nest Lake: Revised Appraisal.
W74-03188 6B

NEW RIVER (VA)
Rotenone Methods in a Large River System,
W74-02736 8I

NEW YORK
Optimal Control of Nitrogen Losses from Land Disposal Areas,
W74-02677 5B

Effects of Migratory Waterfowl on Wate Quality at the Montezuma National Wildlif Refuge, Seneca County, New York,
W74-02733 5E

Flow Characteristics of a Subsurface-Con trolled Recharge Basin on Long Island, Nev York,
W74-02734 4E

Lake Skaneateles--Sewage, Garbage Dumpin Prohibited.
W74-02817 6I

Summary of the Southern Tier East Regiona Plan, Broome and Tioga Counties, New York.
W74-02844 6I

Active Projects, Pure Waters Research.
W74-02851 5I

Managing our Coastal Zone.
W74-03037 5G

NEW ZEALAND
Respiration Rates of Some New Zealan Echinoderms (Note),
W74-02949 5A

NEWFOUNDLAND
Plankton Dynamics in a Newfoundland Lake,
W74-02926 5C

NITRATES
Effect of Nitrite and Nitrate on Chlorophy Fluorescence in Green Algae,
W74-02928 5C

The Appearance of Nitrate Reductase Activit in Nitrogen-Starved Cells of Ankistrodesmu Braunii,
W74-02929 5C

NITRIFICATION
The Appearance of Nitrate Reductase Activit in Nitrogen-Starved Cells of Ankistrodesmu Braunii,
W74-02929 5C

NITRITES
Effect of Nitrite and Nitrate on Chlorophy Fluorescence in Green Algae,
W74-02928 5C

NITROGEN BUDGET
Nitrogen Fixation in Lake Sediments: A Cor tribution to Nitrogen Budget of Lake Mendota
W74-02924 5C

NITROGEN COMPOUNDS
Optimal Control of Nitrogen Losses from Lan Disposal Areas,
W74-02677 5I

Loss of Nitrogen from Various Nitrogen Ferti izers on Irrigated Land,
W74-02936 3

NITROGEN FIXATION
Nitrogen Fixation in Lake Sediments: A Cor tribution to Nitrogen Budget of Lake Mendota
W74-02924 5C

NOCTURNAL
Computation of the Sensible Heat Flux and It Relation to Other Components of the Hea Balance at the Surface,
W74-02940 2I

NON-POINT RUNOFF
EPA Readies Farm Antipollution Guidelines.
W74-03128 5I

NONLINEAR FILTERING
Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume I, Time Series Analysis in Water Quality Modeling,
W74-02823 5B

Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume II, Nonlinear Filtration and Estimation in Water Quality Modeling,
W74-02824 5B

NONLINEAR PROGRAMMING
Multigoal Water Quality Planning Model,
W74-02678 5B

NONPOINT POLLUTION SOURCES
Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities.
W74-02946 5G

NORTH CAROLINA
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

North Carolina Water Plan Progress Report: Chapter 19: Power and Water.
W74-02836 3D

The Liquid Waste Facilities Function Concept.
W74-03039 5D

An Economic Feasibility Study of Fayetteville, North Carolina, Treating Fort Bragg's Wastewater,
W74-03187 5D

NORTH DAKOTA
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

NORTH SEA
Currents and Water Masses,
W74-03029 2E

Diffusion,
W74-03030 5B

Mud in the North Sea,
W74-03031 2J

Sediment Transport by the North Sea,
W74-03032 2J

Sediment Distribution in the North Sea in Relation to Marine Pollution,
W74-03033 5B

NORTHAMPTON COUNTY (PENNSYLVANIA)
Water Supply and Sewage Facilities Plan Update--1970, Lehigh-Northampton Counties, Pennsylvania.
W74-02848 5D

4 Water Pollution, Environmental Enhancement Study.
W74-02856 5G

NORTHEAST U.S
The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

NUCLEAR ENGINEERING
Stimulation Modes of Geothermal Aquifers,
W74-02876 4B

NUCLEAR MAGNETIC RESONANCE
Pulsed Nuclear Magnetic Resonance Studies of Porosity, Movable Fluid, and Permeability of Sandstones,
W74-03166 8G

NUCLEAR POWER PLANTS
Calefaction of the Connecticut River, U.S.A.,
W74-02864 5B

Summary of Legislative and Regulatory Activities Affecting the Environmental Quality of Nuclear Facilities.
W74-02890 5G

Environmental Challenges and Nuclear Fuels,
W74-02892 5B

NUCLEAR POWERPLANTS
The Legal and Regulatory Framework for Thermal Discharge from Nuclear Power Plants,
W74-02875 5G

Environmental Levels of Radioactivity at Atomic Energy Commission Installations.
W74-03136 5A

NUTRIENT REMOVAL
Effect of pH and High Phosphorus Concentrations on Growth of Waterhyacinth,
W74-02934 5C

NUTRIENT REQUIREMENTS
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

NUTRIENTS
Output of Phosphorus, Dissolved Organic Carbon, and Fine Particulate Carbon from Hubbard Brook Watersheds,
W74-02759 2K

Biochemical Effects of Temperature and Nutritive Stress on Mytilus edulis L,
W74-02873 5C

Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

NYMPHS
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

OATS
Investigation on the Ecology and Control of Wild Oat (Avena fatua L.) Under the Conditions in Wroclaw Voivodeship, (In Polish),
W74-02921 3F

OBSTRUCTION TO FLOW
Pierce V. De Jong (Action by Owners of Dominant Estate Against Owners of Servient Estate for Damages for Obstruction of Natural Flow of Surface Waters).
W74-02806 6E

OCEAN CIRCULATION
Currents and Water Masses,
W74-03029 2E

OCEAN CURRENTS
Currents and Water Masses,
W74-03029 2E

Sediment Transport by the North Sea,
W74-03032 2J

OCEAN DUMPING
System for Survellance of Ocean Dumping
W74-03021 5G

OCEAN WAVES
A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

Sea Waves in Coastal Waters of the British Isles,
W74-02710 2L

OCEANS
Evolution of the Law of the Seas--Destruction of the Pristine Nature of Basic Oceanographic Research,
W74-02791 6E

Marine Protection, Research, and Sanctuaries Act of 1972.
W74-02797 6E

ODONATA
Odonata of Sugadaira and Vicinity,
W74-02783 2I

ODOR
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

OFFSHORE PLATFORMS
Method and Apparatus for Determining a Fluid Contaminant,
W74-03000 5G

Protecting Offshore Structures from Ice,
W74-03013 8C

OHIO (ACTON LAKE)
Acton Lake: Biology of Its Benthos and Notes on Its Physical Limnology 1959-1970,
W74-03066 2H

OHIO PLANNING
Solids Waste Disposal.
W74-02840 5D

OHIO RIVER
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

OIL POLLUTION
Federal Legislation Regarding Marine Pollution,
W74-02795 6E

Civil Liability of Shipowners for Oil Pollution,
W74-02796 6E

The Proposed International Compensation Fund for Oil Pollution Damage,
W74-02799 6E

Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

Method and Apparatus for Determining a Fluid Contaminant,
W74-03000 5G

Floating Skimmer,
W74-03005 5G

Apparatus,
W74-03014 5G

Oil Spillage Enclosure System for Marine Use,
W74-03015 5G

Oil Removal from Waste Waters,
W74-03020 5D

Method for Separating Oil from Water,
W74-03023 5G

U. S. Coast Guard Oil Pollution Investigation and Control School, Investigator's Manual.
W74-03027 5G

OIL POLLUTION HANDBOOK
U. S. Coast Guard Oil Pollution Investigation and Control School, Investigator's Manual.
W74-03027 5G

OIL SPILL RECORDS
Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

OIL SPILLS
Federal Legislation Regarding Marine Pollution,
W74-02795 6E

Floating Skimmer,
W74-03005 5G

Apparatus,
W74-03014 5G

Oil Spillage Enclosure System for Marine Use,
W74-03015 5G

Method for Separating Oil from Water,
W74-03023 5G

U. S. Coast Guard Oil Pollution Investigation and Control School, Investigator's Manual.
W74-03027 5G

OIL WASTES
Method for Treating Sewage,
W74-03012 5D

U. S. Coast Guard Oil Pollution Investigation and Control School, Investigator's Manual.
W74-03027 5G

OKLAHOMA
The Identification and Measurement of Chlorinated Hydrocarbon Pesticides Accumulated From Urban Runoff,
W74-02665 5A

ON-SITE TESTS
Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

OPEN CHANNEL FLOW
Application of the Implicit Method to Surges in Open Channels,
W74-02767 2E

Minimization of Power Expenditure in a Riffle-Pool Alluvial Channel,
W74-02768 2J

OPERATING COSTS
A Statistical Approach to Dynamic Modeling and Control of Water Distribution Systems,
W74-02673 4A

An Economic Feasibility Study of Fayetteville, North Carolina, Treating Fort Bragg's Wastewater,
W74-03187 5D

OPERATION AND MAINTENANCE
Application and Operation of Sludge Incineration,
W74-02849 5E

OPTIMIZATION
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

Optimal Investment Orders Under Uncertainty and Dynamic Costs: Theory and Estimates,
W74-03199 6B

ORANGE RIVER (SOUTH AFRICA)
Preliminary Report on Small Fishes From the Hendrik Verwoed Dam, Orange River,
W74-02914 2H

OREGON
A Numerical Model of Coastal Upwelling,
W74-02713 2E

Oregon's Long-Range Requirements for Water.
W74-03119 6D

Lower Willamette River Management Plan.
W74-03121 4A

ORGANIC COMPOUNDS
The Influence of Dissolved Humic Substances on Trace Metal Phototoxicity,
W74-02727 2H

Electrochemical Measurement of Zinc in Organic-Rich Water,
W74-02729 2H

Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

ORGANIC MATTER
Fractionation and Characterization of Natural Organic Matter from Certain Rivers and Soils by Free-Flow Electrophoresis,
W74-03062 2K

ORIBATIDS
A Horizontal Distribution of Oribatids in Exhausted Peat-Bogs of the Balachninskaya Lowland, (In Russian),
W74-02820 2H

OSCILLATIONS (WAVES)
Wave Induced Oscillations in Harbors,
W74-02708 2L

OSCILLATORIA REDEKI
The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

OTTAWA RIVER
Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

OVERDRAFT
Economic Policy for Water Resources and Placement Flows,
W74-03191 4B

OVERLAND FLOW
Hydrodynamics of Laminar Flow Over a Porous Bed,
W74-02770 2E

OWNERSHIP OF BEDS
Red Hook Marina Corporation V. Antilles Yachting Corporation (Action to Recover Unpaid Balance on Note and to Foreclose Purchase Money Mortgage).
W74-02811 6E

OXIDATION
Catalytic Oxidation of Organics in Wastewater,
W74-02655 5D

OXIDATION-REDUCTION POTENTIAL
Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

OXYGEN
Influence of Temperature on Energy Utilization of Embryonic and Prolarval Tautog, Tautoga onitis,
W74-02872 5C

Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

OXYGEN SAG
A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

OXYGENATION
Atmospheric Reaeration Capacity of Streams. Part I. Critical Review of Methods Available to Measure and to Calculate the Atmospheric Reaeration Rate Constant,
W74-02916 5C

A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

PACIFIC NORTHWEST
Pumped Storage Development and Its Environmental Effects.
W74-03144 8B

PACIFIC SALMON
Predation, Particularly by Sculpins, on Salmon Fry in Fresh Waters of Washington,
W74-03058 2I

PACIFIC SALMON AQUACULTURE PROGRAM
Pacific Salmon Aquaculture Program--Incubation and Cultivation Phases,
W74-03028 2L

PAINTS
Apparatus for Separating Paint or the Like from Water,
W74-03008 5D

PAPER MILL WASTES
Slurry Concentrator and Filter Apparatus,
W74-03003 5D

PARTICLE SIZE
Fragmentation of Granitic Quartz in Water,
W74-03065 2J

PARTICLE VELOCITY
Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

PARVIN LAKE (COLO)
Bottom Fauna Changes During Artificial Reservoir Destratification,
W74-02992 5C

PASCAGOULA ESTUARY (MISS)
A Hydrologic Reconnaissance of the Pascagoula River Estuary, Mississippi,
W74-03094 2L

PATENTS
Indirector Chlorinator,
W74-02999 5D

Method and Apparatus for Determining a Fluid Contaminant,
W74-03000 5G

Thermolytic Sewage System,
W74-03001 5D

Iron Removal Filter System,
W74-03002 5F

Slurry Concentrator and Filter Apparatus,
W74-03003 5D

Continuously Regenerating Active Earth Filtering Apparatus for Liquid wastes,
W74-03004 5D

Floating Skimmer,
W74-03005 5G

Filter Bottom and Molded Module Therefor,
W74-03006 5D

Process of Removing Water from Slimes,
W74-03007 5G

Apparatus for Separating Paint or the Like from Water,
W74-03008 5D

Dynamics Reverse Osmosis Membranes of Ultrathin Discs,
W74-03009 3A

MGCO3 Addition to CASO4 Containing Sea Water to Prevent Corrosion,
W74-03010 3A

Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

Method for Treating Sewage,
W74-03012 5D

Protecting Offshore Structures from Ice,
W74-03013 8C

Apparatus,
W74-03014 5G

Oil Spillage Enclosure System for Marine Use,
W74-03015 5G

Sewage Treatment Vessel,
W74-03016 5D

Skimmer for a Water Body,
W74-03017 5G

Surface Aerator Having Wave Attenuator,
W74-03018 5D

Granular to Powdered Activated Carbon in Polluted Water Purification Process,
W74-03019 5D

Oil Removal from Waste Waters,
W74-03020 5D

System for Survellance of Ocean Dumping
W74-03021 5G

Benthic Dredge Construction,
W74-03022 8C

Method for Separating Oil from Water,
W74-03023 5G

PATH OF POLLUTANTS
The Adsorption of Rhodamine-B on to Materials Carried in Suspension by Inshore Waters,
W74-02721 5B

Disposal of Brine into An Estuary,
W74-02735 5B

A Galerkin-Finite Element Simulation of Groundwater Contamination of Long Island, New York,
W74-02772 5B

Sediment Distribution in the North Sea in Relation to Marine Pollution,
W74-03033 5B

Occurrence and Behaviour of Heavy Metals in River Deltas, with Special Reference to the Rhine and EMS Rivers,
W74-03034 5B

Dispersion of Pollutants in Saturated Porous Media,
W74-03093 5B

PATHOGENS (SOIL-BORNE)
Some Aspects of Chemical Control of Soil-Borne Pathogens,
W74-02889 5B

PEAT BOGS
A Horizontal Distribution of Oribatids in Exhausted Peat-Bogs of the Balachninskaya Lowland, (In Russian),
W74-02820 2H

PENNSYLVANIA
Sewerage Facilities Plan, in Accordance with the Pennsylvania Sewerage Act (537).
W74-02832 5D

Escherichia coli Serogroups Isolated from Streams in Pennsylvania, 1965 to 1972,
W74-02988 5A

Random Drilling for Water in Carbonate Rocks,
W74-03141 8B

PERFORATIONS
Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

PERIPHYTON
Total Dissolved Electrolyte Effects on Periphyton,
W74-02990 5C

PERMEABILITY
Groundwater Movement,
W74-03142 4B

Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

Steady and Unsteady Flow Towards Gravity Wells,
W74-03161 4B

Pulsed Nuclear Magnetic Resonance Studies of Porosity, Movable Fluid, and Permeability of Sandstones,
W74-03166 8G

Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

PERMITS
Permit Application by Radcliff Materials, Inc.--Dredging of Dead-Reef Shells, Mobile Bay, Alabama (Final Environmental Statement). 21Available NTIS, Springfield, Va. 22151 as EIS-AL-73-0542-F, Price $12.00 printed copy. February 1973. 187 p, 44 ref.
W74-02737 6G

PESTICIDE INDUSTRY
The Pollution Potential in Pesticide Manufacturing.
W74-02685 5C

PESTICIDE RESIDUES
The Pollution Potential in Pesticide Manufacturing.
W74-02685 5C

The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

PESTICIDE TOXICITY
The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

PESTICIDES
The Pollution Potential in Pesticide Manufacturing.
W74-02685 5C

PETROGRAPHY
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

PETROLOGY
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

Physical Properties of some Typical Foundation Rocks.
W74-03145 8E

PHARAMACEUTICAL PLANTS
Lake Michigan Discharge Studies.
W74-02954 5B

PHENOLS
Catalytic Oxidation of Organics in Wastewater,
W74-02655 5D

Lower Fungi as Test Organisms of Pollutants in Sea and Brackish Water: The Effects of Heavy Metal Compounds and Phenol on Thraustochytrium striatum (In German),
W74-02696 5C

Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

PHOSPHATES
Process of Removing Water from Slimes,
W74-03007 5G

Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

PHOSPHORUS
Output of Phosphorus, Dissolved Organic Carbon, and Fine Particulate Carbon from Hubbard Brook Watersheds,
W74-02759 2K

Effect of pH and High Phosphorus Concentrations on Growth of Waterhyacinth,
W74-02934 5C

Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

PHOSPHORUS COMPOUNDS
Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

PHOTOGRAMMETRY
Tidal Current Surveys by Photogrammetric Methods,
W74-02707 2L

PHOTOGRAPHY
A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

PHOTOPERIODISM
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

PHOTOSYNTHESIS
Effect of Nitrite and Nitrate on Chlorophyll Fluorescence in Green Algae,
W74-02928 5C

The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

PHOTOSYNTHETIC OXYGEN
Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophylliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

PHRAGMITES-COMMUNIS
Higher Water Vegetation and Its Fauna of Krotowaya Laga and Kusgan Lakes (North Kulanda), (In Russian),
W74-02901 2H

PHYSICAL PROPERTIES
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

PHYSICOCHEMICAL PROPERTIES
Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

PHYSIOLOGICAL ECOLOGY
Environmental Control of Phytoplankton Cell Size,
W74-02998 5C

PHYTONEUSTON
Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

PHYTOPLANKTON
Trace Metals in a Tundra Pond: Variations in Concentration and Their Effect on Phytoplankton Populations,
W74-02726 2H

Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

Environmental Control of Phytoplankton Cell Size,
W74-02998 5C

PIPE
Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

PLANKTON
An Annual Plankton Cycle on the Chesapeake Bay in the Vicinity of Calvert Cliffs, Maryland, June 1969 - May, 1970,
W74-02863 5C

Pollution of the 'El Carpincho' Pond (Pampasic Region, Argentina) and Its Effects on Plankton and Fish Communities,
W74-02923 5C

Plankton Dynamics in a Newfoundland Lake,
W74-02926 5C

PLANNING
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

Development of a Marginal Analysis Capability for Water Resources Simulation Models,
W74-02682 4A

A Water Quality Simulation Model,
W74-02683 5B

Regional Wastewater Development Plan, Water Quality Planning.
W74-02830 5D

Sewerage Facilities Plan, in Accordance with the Pennsylvania Sewerage Act (537).
W74-02832 5D

Evaluation of Alternates for Water Pollution Control and Resource Management: Phase III, Pollution Abatement Project, Las Vegas Wash and Bay, Annex C.
W74-02834 5D

Public Policy Alternatives Affecting Water and Sewer Service in Urban Growth Areas.,
W74-02835 3D

North Carolina Water Plan Progress Report: Chapter 19: Power and Water.
W74-02836 3D

Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

Water Quality Management: New Jersey's Vanishing Options.
W74-02841 5G

Water-Resources Planning,
W74-02843 6B

Summary of the Southern Tier East Regional Plan, Broome and Tioga Counties, New York.
W74-02844 6B

Water Supply and Sewage Facilities Plan Update--1970, Lehigh-Northampton Counties, Pennsylvania.
W74-02848 5D

Boulder Creek Flood Control Project--An Environmental Status Report,
W74-02859 6F

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania; Volume I--General, Sewerage Planning, Appendices.
W74-02861 6E

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania: Volume 2--Water Planning.
W74-02862 6E

Master Water Plan, Las Vegas Valley, (With Map Supplement).
W74-03117 6D

Preservation of Reservoir Sites,
W74-03123 6F

Ground Water in Thailand,
W74-03150 4B

Designing for Future Expansion-Development of Ground Water in India,
W74-03151 4B

Social and Economic Impact on Urban Areas of 'Water Policies for the Future,' the National Water Commission Report,
W74-03177 6B

Policy Issues Related to Urbanization,
W74-03178 6B

Water Quality Issues in the National Water Commission's Report 'Water Policies for the Future',
W74-03179 6B

Institutional Problems in the Water Resources Field,
W74-03183 6B

A Challenge to the Academic Community: Economics and Institutions in the Report of the National Water Commission,
W74-03184 6B

PLANT ECOLOGY

Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

PLANT GROWTH

The Effect of Ethylenediaminetetraacetic Acid on the Growth of Chlorella Pyrenoidosa and Its Role in the Dynamics of Metabolism and Accessibility of Iron and Calcium,
W74-02925 5C

The Seasonal Growth of Lovegrass (Eragrostis Curvula) on Deep Sandy Soils In A Semi-Arid Environment,
W74-02942 3F

Environmental Control of Phytoplankton Cell Size,
W74-02998 5C

PLANT MORPHOLOGY

Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

PLANT PHYSIOLOGY

Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

The Occurrence of Heterotrophic Bacteria in the Waters of the Ilawa Lakes and Some of Their Physiological and Biochemical Properties,
W74-02931 5C

PLANT PIGMENTS

Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophylliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

PLASTIC FAILURE

Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

POISONOUS PLANTS

Russian-Thistle (Salsola) Species in Western United States,
W74-02945 4A

POLAND (LOWER SILESIA)

Investigation on the Ecology and Control of Wild Oat (Avena fatua L.) Under the Conditions in Wroclaw Voivodeship, (In Polish),
W74-02921 3F

POLLUTANT IDENTIFICATION

The Identification and Measurement of Chlorinated Hydrocarbon Pesticides Accumulated From Urban Runoff,
W74-02665 5A

Fluorescent Spectroscopy, A Technique for Characterizing Surface Films,
W74-02731 5A

Instrumental Analysis of Chemical Pollutants--Training Manual.
W74-02739 5A

Determination of Polyacrylamide in the Drinking Water by Means of an Adsorption Photometric Method, (In Russian),
W74-02932 5A

Natural Habitat of Caryophanon latum,
W74-02966 5B

Method for the Selective Enumeration of Blue-Green Bacteria in Water,
W74-02974 5A

The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

Escherichia coli Serogroups Isolated from Streams in Pennsylvania, 1965 to 1972,
W74-02988 5A

Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

POLLUTANTS

Water Use for Aquatic Life,
W74-02865 5C

POLLUTION ABATEMENT

Partial Recovery of a Vegetation in a Pollution Damaged Marsh,
W74-02663 5C

Lake Skaneateles--Sewage, Garbage Dumping Prohibited.
W74-02817 6E

Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities.
W74-02946 5G

Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

Method and Apparatus for Determining a Fluid Contaminant,
W74-03000 5G

Floating Skimmer,
W74-03005 5G

Process of Removing Water from Slimes,
W74-03007 5G

Apparatus,
W74-03014 5G

Oil Spillage Enclosure System for Marine Use,
W74-03015 5G

Skimmer for a Water Body,
W74-03017 5G

Granular to Powdered Activated Carbon in Polluted Water Purification Process,
W74-03019 5D

System for Surveillance of Ocean Dumping
W74-03021 5G

Method for Separating Oil from Water,
W74-03023 5G

Wastewater Cleanup Equipment.
W74-03082 5D

A Forecasting Model Applied to Pollution Control Costs,
W74-03189 5G

POLLUTION POTENTIAL

The Pollution Potential in Pesticide Manufacturing.
W74-02685 5C

POLYACRYLAMIDE

Determination of Polyacrylamide in the Drinking Water by Means of an Adsorption Photometric Method, (In Russian),
W74-02932 5A

POLYELECTROLYTES

A New Step Toward Waste Water Treatment (Un nouveau pas vers le traitement des eaux usees).
W74-03089 5D

PONDS
Trace Metals in a Tundra Pond: Variations in Concentration and Their Effect on Phytoplankton Populations,
W74-02726 2H

Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

Respiration and Thermal Tolerance of Phyllopod Crustacea Triops longicaudatus and Thamnocephalus platyurus Inhabiting Desert Ephermeral Ponds,
W74-03090 2H

POPULATION
Hillsborough County, Florida: Population Projections and Environmental Factors.
W74-02838 6D

PORE WATER
Mechanisms Controlling Pore Water Salinities in a Salt Marsh,
W74-02761 2K

POROSITY
Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

Pulsed Nuclear Magnetic Resonance Studies of Porosity, Movable Fluid, and Permeability of Sandstones,
W74-03166 8G

POROUS MEDIA
Dispersion of Pollutants in Saturated Porous Media,
W74-03093 5B

Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

A Double-Electrode Method of Spontaneous Potential Logging,
W74-03170 8G

PORPHYRIDIUM
Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophylliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

POTABLE WATER
Determination of Polyacrylamide in the Drinking Water by Means of an Adsorption Photometric Method, (In Russian),
W74-02932 5A

POTAMOLOGY
Rivers as Dynamic Systems,
W74-02857 2E

POTENTIOMETRIC TITRATION
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

POTHOLES
Pothole Community Management for Livestock and Wildlife in the Intermountain Region,
W74-03083 4A

POWER LOW
Easier, More Exact Method Speeds Annulus Pressure-Loss Calculations,
W74-03162 8G

POWER PLANT SITES
North Carolina Water Plan Progress Report: Chapter 19: Power and Water.
W74-02836 3D

POWER PLANTS
North Carolina Water Plan Progress Report: Chapter 19: Power and Water.
W74-02836 3D

PRECIPITABLE WATER
The Content of Water Vapour in the Atmosphere Over Southern Africa,
W74-02913 2B

PRECIPITATION (ATMOSPHERIC)
The Content of Water Vapour in the Atmosphere Over Southern Africa,
W74-02913 2B

PRECONCENTRATION
Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

PREDATION
Predation, Particularly by Sculpins, on Salmon Fry in Fresh Waters of Washington,
W74-03058 2I

PRESERVATION
Preservation of Wilderness Areas--Hearing on S2453 and Related Wilderness Bills.
W74-02779 6E

Preservation of Reservoir Sites,
W74-03123 6F

PRESSURE
Observations of Avalanche Impact Pressures,
W74-02747 2C

Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

Easier, More Exact Method Speeds Annulus Pressure-Loss Calculations,
W74-03162 8G

PRESSURE MEASURING INSTRUMENTS
Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

PREY FISH
Predation, Particularly by Sculpins, on Salmon Fry in Fresh Waters of Washington,
W74-03058 2I

PRICES
Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

PRIMARY PRODUCTIVITY
Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

PRIOR APPROPRIATION
The Idaho System for the Distribution of Water Among Its Appropriators: An Examination and Assessment,
W74-02793 6E

PRIOR APPROPRIATIONS
Federally Reserved Rights to Underground Water-A Rising Question in the Arid West,
W74-02792 6E

PRIORITIES
Active Projects, Pure Waters Research.
W74-02851 5D

PROBABILITY
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

PROCESS CONTROL
Energy Signature Measures System Changes,
W74-02981 7B

PRODUCTIVITY
Higher Water Vegetation and Its Fauna of Krotowaya Laga and Kusgan Lakes (North Kulanda), (In Russian),
W74-02901 2H

PROFILES
An Investigation of the Deformation and Breaking of Solitary Waves,
W74-02694 2E

Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

PROJECT PLANNING
Flood Control Project Planning by Mathematical Programming: A Project-Expansion Approach,
W74-02674 4A

Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

Functional Water and Sewer Report,
W74-03122 3D

Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

Eagle Nest Lake: Revised Appraisal.
W74-03188 6B

PROJECT POST-EVALUATION
The California State Water Project Summary: Nineteen-Seventy-Two, Appendix C.
W74-03026 4A

PROJECTILES
Terradynamics,
W74-03165 8E

PROJECTIONS
Hillsborough County, Florida: Population Projections and Environmental Factors.
W74-02838 6D

Oregon's Long-Range Requirements for Water.
W74-03119 6D

PROJECTS
Active Projects, Pure Waters Research.
W74-02851 5D

PROPERTIES
Mudflow Properties and Patterns (O svoystvakh i zakonomernostyakh selevykh potokov),
W74-02750 2J

PROPERTY BOUNDARIES
Red Hook Marina Corporation V. Antilles Yachting Corporation (Action to Recover Unpaid Balance on Note and to Foreclose Purchase Money Mortgage).
W74-02811 6E

PROPERTY VALUES
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

PROTEAS
Comparative Transpiration Studies of Some Cape Proteas,
W74-02908 2D

PROTEINS
The Measurement of the Heat of Reaction Between Proteins and Clay Minerals by Microcalorimetry,
W74-02669 2G

PROTOZOA
Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

PROTOZOANS
Preliminary Report on Simulated Passage Effect of Potential Colonizing Protozoans Through Condenser of a Steam Electric Power Generating Plant Upon Downstream Protozoan Community Development,
W74-02930 5C

PUBLIC ACCESS
Gulf Holding Corp. V. Brazoria County (Order Enjoining Landowner from Obstructing Public Use of Beach).
W74-02805 6E

Public Use of Private Lands and Waters.
W74-02812 6E

PUBLIC POLICY
The University and Public Policy in Water Resources, Proceedings UCOWR Annual Meeting held July 29-August 1, 1973 at Texas Tech University, Lubbock, Texas.
W74-03172 6B

PUBLICATIONS
Primary Publications in Environmental Science,
W74-03044 10A

PUDDLED SOILS
Effect of Drying on Water Retention of a Puddled Soil,
W74-03186 2G

PUERTO RICO
Water Resources of the Ponce Area, Puerto Rico,
W74-03038 4A

PUGET SOUND (WASH)
Pacific Salmon Aquaculture Program--Incubation and Cultivation Phases,
W74-03028 2L

Checklist of Puget Sound Fishes,
W74-03060 2L

PULP AND PAPER INDUSTRY
The Full-Scale Refinement of Purified Sewage for Unrestricted Industrial use in the Manufacture of Fully Bleached Kraft-Pulp and Fine Paper,
W74-02906 5D

PULP WASTES
Total Dissolved Electrolyte Effects on Periphyton,
W74-02990 5C

Slurry Concentrator and Filter Apparatus,
W74-03003 5D

The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

Characterization of Sulfite Pulp Bleaching Effluents and Their Behavior During Biodegradation (Abwassertechnische Charakterisierung von Sulfitzellstoffbleicherei-Abwassern und deren Verhalten beim biologischen Abbau),
W74-03073 5D

Color Removal and Sludge Recovery from Total Mill Effluent,
W74-03077 5D

Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

Biological Surveys: Intent, Methodology, Interpretation,
W74-03086 5C

Effluent Treatment Plants in the Forest Products Industry (Puunjalostusteollisuuden jatevesipuhdistamot),
W74-03087 5D

PULSE TEST
Planning and Analysis of Pulse-Tests,
W74-03164 2F

PULSED NMR
Pulsed Nuclear Magnetic Resonance Studies of Porosity, Movable Fluid, and Permeability of Sandstones,
W74-03166 8G

PUMPED STORAGE
Pumped Storage Development and Its Environmental Effects.
W74-03144 8B

PUMPING
Mutual Interference of Water Wells,
W74-03154 8B

PUMPS
Deep Well Submersibles are Growing,
W74-03147 8C

PYNOCLINE
A Numerical Model of Coastal Upwelling,
W74-02713 2E

QUARTZ
Fragmentation of Granitic Quartz in Water,
W74-03065 2J

RADIOACTIVITY
Environmental Levels of Radioactivity at Atomic Energy Commission Installations.
W74-03136 5A

RADIOISOTOPES
Geochronological Studies in Santa Barbara Basin: Fe-55 as a Unique Tracer for Particulate Settling,
W74-02722 2J

A Statement Prepared for Submission at the Public Hearing on Application Made by Baltimore Gas and Electric Company for a Permit to Appropriate and Use Surface Water for Operation of the Calvert Cliffs Nuclear Power Plant Made to the Maryland Department of Water Resources,
W74-02886 5C

RADIOSONDES
The Content of Water Vapour in the Atmosphere Over Southern Africa,
W74-02913 2B

RAINBOW TROUT
A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

RAINFALL DISPOSITION
Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

RAINFALL-RUNOFF RELATIONSHIPS
Forest Transpiration Greatly Speeds Streamflow Recession,
W74-02766 2D

Comparison of Methods of Deriving Unit Hydrographs,
W74-02828 2E

Mean Rainfall and Mean Runoff in South Africa; an Investigation into Phase Differences,
W74-02909 2A

A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

RANGE GRASSES
Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

RANGE MANAGEMENT
Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

REAERATION
Atmospheric Reaeration Capacity of Streams. Part I. Critical Review of Methods Available to Measure and to Calculate the Atmospheric Reaeration Rate Constant,
W74-02916 5C

Atmospheric Reaeration Capacity of Streams. Part II. Direct Measurement of the Atmospheric Reaeration Rate Constant in the Upper Raritan River Basin,
W74-02917 5C

REAERATION RATE CONSTANT
Atmospheric Reaeration Capacity of Streams. Part I. Critical Review of Methods Available to Measure and to Calculate the Atmospheric Reaeration Rate Constant,
W74-02916 5C

Atmospheric Reaeration Capacity of Streams. Part II. Direct Measurement of the Atmospheric Reaeration Rate Constant in the Upper Raritan River Basin,
W74-02917 5C

RECESSION CURVES
Forest Transpiration Greatly Speeds Streamflow Recession,
W74-02766 2D

RECHARGE PONDS
Flow Characteristics of a Subsurface-Controlled Recharge Basin on Long Island, New York,
W74-02734 4B

RECIRCULATED WATER
Reuse Irrigation Cuts Costs,
W74-03194 5D

RECIRCULATION
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

RECORDERS (X-Y)
X-Y Recorders.
W74-02969 7C

RECREATION
A Bill to Establishment The Missouri Breaks Scenic Recreation River in the State of Montana.
W74-02788 6E

A Bill to Authorize the Secretary of the Interior to Study the Feasibility and Desirability of a Boston Harbor National Recreation Area in the State of Massachusetts.
W74-02790 6E

Public Use of Private Lands and Waters.
W74-02812 6E

Eagle Nest Lake: Revised Appraisal.
W74-03188 6B

RECREATION DEMAND
Value Comparisons in Free-Flowing Stream Development,
W74-03190 6B

RECREATION FACILITIES
The Ocean Edge of San Diego,
W74-03120 6D

RECYCLING
Reuse Irrigation Cuts Costs,
W74-03194 5D

RED RIVER OF THE NORTH (N. DAK)
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

REFORESTATION
Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities.
W74-02946 5G

REFRACTION (WATER WAVES)
Equilibrium Shapes of Coastline in Plan,
W74-03105 2J

Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2J

REGIONAL ANALYSIS
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

Regional Planning for Sewerage Systems,
W74-02860 6A

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania; Volume I--General, Sewerage Planning, Appendices.
W74-02861 6E

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania: Volume 2--Water Planning.
W74-02862 6E

REGIONAL DEVELOPMENT
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

Summary of the Southern Tier East Regional Plan, Broome and Tioga Counties, New York.
W74-02844 6B

Water Supply and Sewage Facilities Plan Update--1970, Lehigh-Northampton Counties, Pennsylvania.
W74-02848 5D

Economic and Social Purposes Related to Water Management,
W74-03197 6B

REGIONAL ECONOMICS
Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

REGIONAL PLANNING
Sewerage Facilities Plan, in Accordance with the Pennsylvania Sewerage Act (537).
W74-02832 5D

Regional Planning for Sewerage Systems,
W74-02860 6A

REGIONALIZATION
Comprehensive Water and Sewer Study, Hamilton, Walker, and Catoosa Counties, (Book Two).
W74-02833 5D

REGULATION
Evaluation of the Tennessee Water Supply Program, Summary.
W74-03158 5G

REGULATIONS
The Legal and Regulatory Framework for Thermal Discharge from Nuclear Power Plants,
W74-02875 5G

Summary of Legislative and Regulatory Activities Affecting the Environmental Quality of Nuclear Facilities.
W74-02890 5G

REHABILITATION
Pollution of the 'El Carpincho' Pond (Pampasic Region, Argentina) and Its Effects on Plankton and Fish Communities,
W74-02923 5C

REMOTE CONTROL
The Denver System of Controls,
W74-02854 5F

REMOTE SENSING
Fluorescent Spectroscopy, A Technique for Characterizing Surface Films,
W74-02731 5A

Research in the Coastal and Oceanic Environment,
W74-03096 2J

Terradynamics,
W74-03165 [illegible]E

REPRODUCTION
Reversible Heat Injury in the Marine Psychrophilic Bacterium Vibrio marinus MP-1,
W74-02883 5C

RESEARCH AND DEVELOPMENT
Active Projects, Pure Waters Research.
W74-02851 5D

An Inventory of Environmental Resources Research in Progress, Colorado State University.
W74-03133 6G

What About Water.
W74-03135 6E

RESEARCH FACILITIES
Active Projects, Pure Waters Research.
W74-02851 5D

ESERVATION DOCTRINE
Federally Reserved Rights to Underground Water-A Rising Question in the Arid West,
W74-02792 6E

ESERVOIR CONSTRUCTION
Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

ESERVOIR LEVELS
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

ESERVOIR SITES
Preservation of Reservoir Sites,
W74-03123 6F

ESERVOIR STORAGE
Pumped Storage Development and Its Environmental Effects.
W74-03144 8B

ESERVOIRS
Development of a Marginal Analysis Capability for Water Resources Simulation Models,
W74-02682 4A

Determination of the Heat Capacity of Lake Kariba,
W74-02910 2H

Population Studies of Bigmouth Buffalo in Coralville Reservoir with Special Reference to Commercial Harvest,
W74-03036 8I

Preservation of Reservoir Sites,
W74-03123 6F

ESIDENCE TIME
Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

ESISTANCE
Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

Differential Tolerance of Six Leguminous Crops to Terbutryne,
W74-02941 3F

Microdilution Antibiotic Susceptibility Test: Examination of Certain Variables,
W74-02968 5A

ESISTIVITY
Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

ESOURCES DEVELOPMENT
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

ESPIRATION
Respiration Rates of Some New Zealand Echinoderms (Note),
W74-02949 5A

Respiration and Thermal Tolerance of Phyllopod Crustacea Triops longicaudatus and Thamnocephalus platyurus Inhabiting Desert Ephermeral Ponds,
W74-03090 2H

RETARDANTS
Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

RETURN FLOW
Reuse Irrigation Cuts Costs,
W74-03194 5D

REVERSE-FLOW FILTRATION
Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

REVERSE OSMOSIS
Dynamics Reverse Osmosis Membranes of Ultrathin Discs,
W74-03009 3A

REVERSIBLE PUMP/TURBINES
Pumped Storage Development and Its Environmental Effects.
W74-03144 8B

REVIEWS
Industrial and High Velocity Metering,
W74-02858 5F

The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

Hydrodynamics of Artificial Groundwater Recharge (Saturated Flow Theory),
W74-03091 4B

REYNOLDS NUMBER
High Reynolds Numbers Unsteady Convective Mass Transfer from Fluid Spheres,
W74-02891 2B

RHINE RIVER (NETHERLANDS)
Occurrence and Behaviour of Heavy Metals in River Deltas, with Special Reference to the Rhine and EMS Rivers,
W74-03034 5B

RHODAMINE
The Adsorption of Rhodamine-B on to Materials Carried in Suspension by Inshore Waters,
W74-02721 5B

RHODE ISLAND
Partitioning of the Estuarine Environment by Two Species of Cancer,
W74-02717 2L

RHODOPHYTA
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

RILL EROSION
The Role of Rainfall Impact in Soil Detachment and Transport,
W74-02769 2J

RIO GRANDE BASIN
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

RIO GRANDE RIVER
Pollution Abatement Project, Bandelier National Monument, New Mexico (Final Environmental Impact Statement).
W74-02801 5D

RIPARIAN PLANTS
Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

RIPARIAN RIGHTS
Harthman V. Witty (Appeal from District Court Order Denying Motion for Assessment of Damages Against Shopping Center for Violation of Injunction Against Pollution of Stream).
W74-02809 6E

RIPARIAN WATER LOSS
Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

RISKS
Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

Optimal Investment Orders Under Uncertainty and Dynamic Costs: Theory and Estimates,
W74-03199 6B

RIVER BASIN COMMISSIONS
Water quality Management Plan for the Green and Cedar River Basins in the State of Washington: Progress Report for Fiscal Year Ending June 30, 1972.
W74-02842 5D

RIVER BASIN DEVELOPMENT
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

Pa Mong Stage one Feasibility Report. Appendix VI. Economic, Agricultural, Social and Financial Analysis.
W74-02686 6B

Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

Water quality Management Plan for the Green and Cedar River Basins in the State of Washington: Progress Report for Fiscal Year Ending June 30, 1972.
W74-02842 5D

Lower Willamette River Management Plan.
W74-03121 4A

RIVER BASINS
Multigoal Water Quality Planning Model,
W74-02678 5B

RIVER FLOW
Sea Level as Affected by River Runoff, Eastern United States,
W74-02709 2E

Rivers as Dynamic Systems,
W74-02857 2E

RIVER MANAGMENT
Lower Willamette River Management Plan.
W74-03121 4A

RIVER REGULATION
Lower Willamette River Management Plan.
W74-03121 4A

RIVER SYSTEM DYNAMICS
Rivers as Dynamic Systems,
W74-02857 2E

RIVER SYSTEMS
Public Use of Private Lands and Waters.
W74-02812 6E

RIVERBANKS
Summary of the Southern Tier East Regional Plan, Broome and Tioga Counties, New York.
W74-02844 6B

RIVERS
Summary of the Southern Tier East Regional Plan, Broome and Tioga Counties, New York.
W74-02844 6B

Rivers as Dynamic Systems,
W74-02857 2E

Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

ROAD CONSTRUCTION
Laying Out, Altering and Discontinuing Highways.
W74-03132 6E

ROCK FOUNDATIONS
Physical Properties of some Typical Foundation Rocks.
W74-03145 8E

ROCK PROCESSING
Process of Removing Water from Slimes,
W74-03007 5G

ROCK PROPERTIES
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

Physical Properties of some Typical Foundation Rocks.
W74-03145 8E

The Role of Rock Strength Anisotropy in Natural Hole Deviation,
W74-03156 8B

ROCK WELLS
Feasibility Study: Hydraulic Fracturing of Drilled Water Wells to Stimulate Their Yield,
W74-02659 8B

ROCKY MOUNTAIN REGION
Snowmelt Lysimeters Perform Well in Cold Temperatures in Central Colorado,
W74-03067 2C

RODENTS
Small Mammals Increase on Recently Cleared and Seeded Juniper Rangeland,
W74-02938 4A

ROMANIA
Contribution to Knowledge about the Algae (Excluding Bacillariophyceae) of Stagnant Waters of the Iron Gates of the Danube,
W74-02699 5C

ROMANIA (RIVER OLT)
Hydrochemical Investigations Regarding the River Olt, in the Section of Turnu Rosu Pass, (In Rumanian),
W74-02903 2K

ROOTED AQUATIC PLANTS
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

ROTATORIA
A Microbenthos Study of Rotatoria,
W74-02893 2H

ROTENONE
Rotenone Methods in a Large River System,
W74-02736 8I

RUNOFF
Sea Level as Affected by River Runoff, Eastern United States,
W74-02709 2E

Investigation of Correlation of Annual Runoff for Appalachian Rivers (Issledovaniye korrelyativnoy svyazi godovogo stoka Appalachskikh rek),
W74-02752 2E

Mean Rainfall and Mean Runoff in South Africa; an Investigation into Phase Differences,
W74-02909 2A

RUSSIAN THISTLE
Russian-Thistle (Salsola) Species in Western United States,
W74-02945 4A

SAINT JOHN RIVER (CANADA)
A Water Quality Simulation Model,
W74-02683 5B

SALINE LAKES
Studies on a Saline Lake Ecosystem,
W74-02920 5C

SALINE WATER
Baylands Salt Water Flood Control Planning Study.
W74-02829 4A

SALINE WATER-FRESHWATER INTERFACES
Dispersal Processes of Freshwaters in the Po River Coastal Area,
W74-02758 2E

SALINITY
Mechanisms Controlling Pore Water Salinities in a Salt Marsh,
W74-02761 2K

The Surface Waters off the Coast of Kerala, South-West India,
W74-03103 2E

SALMON
Pacific Salmon Aquaculture Program--Incubation and Cultivation Phases,
W74-03028 2L

Predation, Particularly by Sculpins, on Salmon Fry in Fresh Waters of Washington,
W74-03058 2I

SALMONIDS (GILL DISEASE)
Studies on Selected Myxobacteria Pathogenic for Fishes and on Bacterial Gill Disease in Hatchery-Reared Salmonids,
W74-02672 5C

SALT MARSHES
Mechanisms Controlling Pore Water Salinities in a Salt Marsh,
W74-02761 2K

SAMPLE PREPARATION
The Observation of Micro-Organisms on Surfaces by Incident Fluorescence Microscopy,
W74-02989 5A

SAMPLING
Use of Censored Data in the Estimation of Gumbel Distribution Parameters for Annual Maximum Flood Series,
W74-02763 2E

Decomposition of Marine Copepods,
W74-02973 5A

The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

SAN ANTONIO (TEX)
Regional Wastewater Development Plan, Water Quality Planning.
W74-02830 5D

SAN DIEGO (CALIF)
San Diego's Offshore Area,
W74-02831 6F

The Ocean Edge of San Diego,
W74-03120 6D

SAN FRANCISCO BAY (CALIF.)
Baylands Salt Water Flood Control Planning Study.
W74-02829 4A

SAND CONSOLIDATION
Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

SAND WAVES
Sediment Transport by the North Sea,
W74-03032 2J

SANDS
The Seasonal Growth of Lovegrass (Eragrostis Curvula) on Deep Sandy Soils In A Semi-Arid Environment,
W74-02942 3F

Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

A Double-Electrode Method of Spontaneous Potential Logging,
W74-03170 8G

SANDSTONES
Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

Pulsed Nuclear Magnetic Resonance Studies of Porosity, Movable Fluid, and Permeability of Sandstones,
W74-03166 8G

ANITARY ENGINEERING
Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

ARDINES
Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

ATURATED FLOW
Dispersion of Pollutants in Saturated Porous Media,
W74-03093 5B

CALE MODELS
Feasibility of Modeling Run-up Effects of Dispersive Water Waves,
W74-03106 8B

CALING
Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

CENERY
A Bill to Establishment The Missouri Breaks Scenic Recreation River in the State of Montana.
W74-02788 6E

CIOTO RIVER (OHIO)
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

COTLAND (LOCH ETIVE)
An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

CREENS
A German Filter Belt Press (La Siebbandpresse),
W74-03088 5D

EA ICE
Protecting Offshore Structures from Ice,
W74-03013 8C

EA LEVEL
Sea Level as Affected by River Runoff, Eastern United States,
W74-02709 2E

The Effects of Water Table and Tide Cycle on Swash-Backwash Sediment Distribution and Beach Profile Development,
W74-02716 2J

EA OF JAPAN
Littoral Fauna Along the NW Coast of the Sea of Japan,
W74-02691 2L

EA WATER
Lower Fungi as Test Organisms of Pollutants in Sea and Brackish Water: The Effects of Heavy Metal Compounds and Phenol on Thraustochytrium striatum (In German),
W74-02696 5C

The Ionic Activity Function of Water and the Activity Coefficient of the Hydrogen Ion in Seawater,
W74-02760 1B

Decomposition of Marine Copepods,
W74-02973 5A

Diffusion,
W74-03030 5B

SEASHORES
Clearwater Coastal Zone Management Plan.
W74-03116 2L

SEASONAL
Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

The Seasonal Growth of Lovegrass (Eragrostis Curvula) on Deep Sandy Soils In A Semi-Arid Environment,
W74-02942 3F

Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

Coastal Storms of the Eastern United States,
W74-03098 2B

The Surface Waters off the Coast of Kerala, South-West India,
W74-03103 2E

SEATTLE (WASH.)
Water quality Management Plan for the Green and Cedar River Basins in the State of Washington: Progress Report for Fiscal Year Ending June 30, 1972.
W74-02842 5D

SEDIMENT CONTROL
An Overview of Maryland's Sediment Control Program,
W74-02852 5G

SEDIMENT TRANSPORT
A Function for Sand Movement by Wind,
W74-02689 2J

The Southern Monterey Bay Littoral Cell: A Preliminary Sediment Budget Study,
W74-02695 2L

Coastal Sand Dunes of Guerrero Negro, Baja California, Mexico,
W74-02704 2L

Crater-Sink Sand Transfer System,
W74-02705 8A

Longshore Transport of Sand,
W74-02706 2J

Deformation of Temporal Pattern of Orbital Wave Velocity and Sediment Transport in Shoaling Water, In Breaker Zone and on Foreshore,
W74-02711 2L

A Preliminary Investigation of the Recent Sediments Off the East Coast of Australia,
W74-02714 2J

Residual Currents in Relation to Shoreline Evolution of the East Anglian Coast,
W74-02720 2J

Mud in the North Sea,
W74-03031 2J

Sediment Transport by the North Sea,
W74-03032 2J

Sediment Distribution in the North Sea in Relation to Marine Pollution,
W74-03033 5B

Research in the Coastal and Oceanic Environment,
W74-03096 2J

Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2J

Equilibrium Shapes of Coastline in Plan,
W74-03105 2J

Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

Sediment Transport by Waves and Currents,
W74-03111 2J

Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2J

SEDIMENT-WATER INTERFACES
Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

SEDIMENTARY STRUCTURES
Antidune and Chute and Pool Structures in the Base Surge Deposits of the Laacher See Area, Germany,
W74-03063 2J

SEDIMENTATION
Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

The Effects of Water Table and Tide Cycle on Swash-Backwash Sediment Distribution and Beach Profile Development,
W74-02716 2J

Sedimentation on the Western Delta-Front of the Fraser River, British Columbia,
W74-03061 2L

Quantitative Studies of Beach Morphology and Beach Forming Processes,
W74-03104 2J

Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

SEDIMENTATION RATES
Geochronological Studies in Santa Barbara Basin: Fe-55 as a Unique Tracer for Particulate Settling,
W74-02722 2J

SEDIMENTS
Nitrogen Fixation in Lake Sediments: A Contribution to Nitrogen Budget of Lake Mendota,
W74-02924 5C

The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

SEISMIC STUDIES
Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

SELECTIVITY
Method for the Selective Enumeration of Blue-Green Bacteria in Water,
W74-02974 5A

SEMICONFINED FLOW
Steady and Unsteady Flow Towards Gravity Wells,
W74-03161 4B

SENSORS
Method and Apparatus for Determining a Fluid Contaminant,
W74-03000 5G

SEPARATION TECHNIQUES
Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

Method and Apparatus for Determining a Fluid Contaminant,
W74-03000 5G

Floating Skimmer,
W74-03005 5G

A German Filter Belt Press (La Siebbandpresse),
W74-03088 5D

SEPTIC TANKS
Individual Home Aerobic Wastewater Treatment Systems,
W74-02668 5D

SEROTYPES
Escherichia coli Serogroups Isolated from Streams in Pennsylvania, 1965 to 1972,
W74-02988 5A

SEWAGE
Harthman V. Witty (Appeal from District Court Order Denying Motion for Assessment of Damages Against Shopping Center for Violation of Injunction Against Pollution of Stream).
W74-02809 6E

Sewerage Facilities Plan, in Accordance with the Pennsylvania Sewerage Act (537).
W74-02832 5D

SEWAGE BACTERIA
The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

SEWAGE DISPOSAL
Individual Home Aerobic Wastewater Treatment Systems,
W74-02668 5D

Pollution Abatement Project, Bandelier National Monument, New Mexico (Final Environmental Impact Statement).
W74-02801 5D

Lake Skaneateles--Sewage, Garbage Dumping Prohibited.
W74-02817 6E

SEWAGE EFFLUENTS
Hillsborough County, Florida: Population Projections and Environmental Factors.
W74-02838 6D

SEWAGE LAGOONS
Pollution Abatement Project, Bandelier National Monument, New Mexico (Final Environmental Impact Statement).
W74-02801 5D

SEWAGE MICROORGANISMS
Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

SEWAGE SLUDGE
Application and Operation of Sludge Incineration,
W74-02849 5E

SEWAGE TREATMENT
Regional Planning for Sewerage Systems,
W74-02860 6A

The Full-Scale Refinement of Purified Sewage for Unrestricted Industrial use in the Manufacture of Fully Bleached Kraft-Pulp and Fine Paper,
W74-02906 5D

Indirector Chlorinator,
W74-02999 5D

Thermolytic Sewage System,
W74-03001 5D

Method for Treating Sewage,
W74-03012 5D

Sewage Treatment Vessel,
W74-03016 5D

Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

Wastewater Cleanup Equipment.
W74-03082 5D

SEWERAGE
Regional Wastewater Development Plan, Water Quality Planning.
W74-02830 5D

Comprehensive Water and Sewer Study, Hamilton, Walker, and Catoosa Counties, (Book Two).
W74-02833 5D

Public Policy Alternatives Affecting Water and Sewer Service in Urban Growth Areas.,
W74-02835 3D

Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

Water Supply and Sewage Facilities Plan Update--1970, Lehigh-Northampton Counties, Pennsylvania.
W74-02848 5D

Regional Planning for Sewerage Systems,
W74-02860 6A

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania; Volume I--General, Sewerage Planning, Appendices.
W74-02861 6E

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania: Volume 2--Water Planning.
W74-02862 6E

Functional Water and Sewer Report,
W74-03122 3D

SEWERS
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

SEXUAL MATURITY
Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

SHAD
Observations on the Reactions of Young American Shad to a Heated Effluent,
W74-02900 5C

SHALES
A Double-Electrode Method of Spontaneous Potential Logging,
W74-03170 8G

SHALLOW WATER
Observations on Floating Breakwaters for Reflection of Shallow Water Waves (Recherches Sur Les Brise-Lames Flottants Destines A Reflechir La Houle En Eau Peu Profonde),
W74-02693 2J

Water Wave Run-Up on a Beach,
W74-02698 2E

Free Oscillations in the Gulf of Civitavecchia and the Effect of Kinetic Viscosity (Le Oscillazioni Libere Del Golfo Di Civitavecchia E L'azione Della Viscosita Cinematica),
W74-02703 2L

Sea Waves in Coastal Waters of the British Isles,
W74-02710 2L

Deformation of Temporal Pattern of Orbital Wave Velocity and Sediment Transport in Shoaling Water, In Breaker Zone and on Foreshore,
W74-02711 2L

Research in the Coastal and Oceanic Environment,
W74-03096 2J

Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2J

Wave Runup, Mono Lake Tests, 1965: A Summary of Theoretical Prediction Methods and Some Comparisons with Experimental Data,
W74-03113 2H

Calculation of a Solitary Wave Shoaling on a Shallow Slope,
W74-03115 8B

SHEAR
Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

SHEAR STRENGTH
Physical Properties of some Typical Foundation Rocks.
W74-03145 8E

SHELLFISH
Effects of Migratory Waterfowl on Water Quality at the Montezuma National Wildlife Refuge, Seneca County, New York,
W74-02733 5B

Incidence of Vibrio parahaemolyticus in Shellfish from Eight Canadian Atlantic Sampling Areas,
W74-03185 5A

SHINERS
Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

SHIPS
Oil Spillage Enclosure System for Marine Use,
W74-03015 5G

SHOALING
An Investigation of the Deformation and Breaking of Solitary Waves,
W74-02694 2E

Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

SHORE PROTECTION
Observations on Floating Breakwaters for Reflection of Shallow Water Waves (Recherches Sur Les Brise-Lames Flottants Destines A Reflechir La Houle En Eau Peu Profonde),
W74-02693 2J

The Ocean Edge of San Diego,
W74-03120 6D

SHORES
Residual Currents in Relation to Shoreline Evolution of the East Anglian Coast,
W74-02720 2J

SHRIMP
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

SIGNAL CONDITIONING
On-Line Signal Digitizing for Computer Input,
W74-02950 7C

Digital Magnetic Recording of Wideband Analog Signals,
W74-02982 7C

SILVER IODIDE
Weather Modification Operations in California, October 1, 1968 - September 30, 1969,
W74-03056 3B

SIMULATED PASSAGE
Preliminary Report on Simulated Passage Effect of Potential Colonizing Protozoans Through Condenser of a Steam Electric Power Generating Plant Upon Downstream Protozoan Community Development,
W74-02930 5C

SIMULATED RAINFALL
Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

SIMULATION ANALYSIS
Simulation Model for Evaluation of Interception Loss from Forest Trees, Part I. Modeling Snow Interception on Conifers and Part II. Laboratory Modeling of Snow Interception on Trees,
W74-02656 2I

A Statistical Approach to Dynamic Modeling and Control of Water Distribution Systems,
W74-02673 4A

Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

Development of a Marginal Analysis Capability for Water Resources Simulation Models,
W74-02682 4A

A Water Quality Simulation Model,
W74-02683 5B

New Simulation Approaches to the Modeling of Environmental Systems,
W74-02684 6A

Material Property and Boundary Condition Effects on Stresses in Avalanche Snowpacks,
W74-02743 2C

A Methodology for Assessing Environmental Impact of Water Resources Development.
W74-02822 6B

Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

SKIMMING
Floating Skimmer,
W74-03005 5G

Skimmer for a Water Body,
W74-03017 5G

SKIN EFFECT
Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

SLUDGE
Optimal Control of Nitrogen Losses from Land Disposal Areas,
W74-02677 5B

Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

SLUDGE DISPOSAL
Solids Waste Disposal.
W74-02840 5D

Application and Operation of Sludge Incineration,
W74-02849 5E

Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

SLUDGE TREATMENT
Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

Color Removal and Sludge Recovery from Total Mill Effluent,
W74-03077 5D

A German Filter Belt Press (La Siebbandpresse),
W74-03088 5D

A New Step Toward Waste Water Treatment (Un nouveau pas vers le traitement des eaux usees).
W74-03089 5D

SLURRIES
Slurry Concentrator and Filter Apparatus,
W74-03003 5D

SMALL ANIMALS (MAMMALS)
Small Mammals Increase on Recently Cleared and Seeded Juniper Rangeland,
W74-02938 4A

SMELTERS
Lake Michigan Discharge Studies.
W74-02954 5B

SNOW
Ablation Characteristics of an Alpine Snow Field in Summer,
W74-02653 2C

Simulation Model for Evaluation of Interception Loss from Forest Trees, Part I. Modeling Snow Interception on Conifers and Part II. Laboratory Modeling of Snow Interception on Trees,
W74-02656 2I

SNOW COVER
Snow Survey Measurements Through 1970,
W74-02738 2C

SNOW MECHANICS
Advances in North American Avalanche Technology: 1972 Symposium.
W74-02740 2C

Ultrasonic Emissions in Snow,
W74-02741 2C

Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

Material Property and Boundary Condition Effects on Stresses in Avalanche Snowpacks,
W74-02743 2C

On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

Statistical Problems in Snow Mechanics,
W74-02745 2C

SNOW MECHANICS

Controlled Release of Avalanches by Explosives,
W74-02746 2C

Observations of Avalanche Impact Pressures,
W74-02747 2C

SNOW SURVEYS
Snow Survey Measurements Through 1970,
W74-02738 2C

SNOWMELT
Snowmelt Lysimeters Perform Well in Cold Temperatures in Central Colorado,
W74-03067 2C

SNOWPACKS
Advances in North American Avalanche Technology: 1972 Symposium.
W74-02740 2C

Ultrasonic Emissions in Snow,
W74-02741 2C

Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

Material Property and Boundary Condition Effects on Stresses in Avalanche Snowpacks,
W74-02743 2C

On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

Statistical Problems in Snow Mechanics,
W74-02745 2C

Controlled Release of Avalanches by Explosives,
W74-02746 2C

SOCIAL ASPECTS
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

Social and Economic Impact on Urban Areas of 'Water Policies for the Future,' the National Water Commission Report,
W74-03177 6B

Policy Issues Related to Urbanization,
W74-03178 6B

SOCIAL IMPACT
Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

SOCIAL PARTICIPATION
Problems and Instruments Relating to the Allocation of Environmental Costs.
W74-03198 6B

SODIUM COMPOUNDS
Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

SODIUM SULFIDE
Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

SOIL EROSION
The Role of Rainfall Impact in Soil Detachment and Transport,
W74-02769 2J

An Overview of Maryland's Sediment Control Program,
W74-02852 5G

SOIL MOISTURE
Soil Type, Moisture, Temperature and the Longevity of a Nematode Species of the Genus Tylenchorhynchus in the Absence of Plants,
W74-02719 2I

Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

SOIL SEALANTS
Survey of Rain Run-Off Harvesting,
W74-02915 3B

Sealing Abandoned Water Wells.
W74-03169 8F

SOIL STABILIZATION
Survey of Rain Run-Off Harvesting,
W74-02915 3B

SOIL TEMPERATURE
Soil Type, Moisture, Temperature and the Longevity of a Nematode Species of the Genus Tylenchorhynchus in the Absence of Plants,
W74-02719 2I

SOIL TYPES
Soil Type, Moisture, Temperature and the Longevity of a Nematode Species of the Genus Tylenchorhynchus in the Absence of Plants,
W74-02719 2I

SOILS
Magnetic Susceptibility of the Excess Temporary Moistening of Soils, (in Russian),
W74-02877 2G

Fractionation and Characterization of Natural Organic Matter from Certain Rivers and Soils by Free-Flow Electrophoresis,
W74-03062 2K

SOLID WASTES
Application and Operation of Sludge Incineration,
W74-02849 5E

SOLIFUCTION
Mudflow Properties and Patterns (O svoystvakh i zakonomernostyakh selevykh potokov),
W74-02750 2J

SOLITARY WAVES
An Investigation of the Deformation and Breaking of Solitary Waves,
W74-02694 2E

Calculation of a Solitary Wave Shoaling on a Shallow Slope,
W74-03115 8B

SOLUBILITY
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

SOLVATION
Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

SOUND WAVES
Ultrasonic Emissions in Snow,
W74-02741 2C

SOUNDS
Checklist of Puget Sound Fishes,
W74-03060 2L

SOUTH AFRICA
Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

Mean Rainfall and Mean Runoff in South Africa; an Investigation into Phase Differences,
W74-02909 2A

Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

SOUTH CAROLINA
Clemson University V. First Provident Corporation (Suit to Enjoin Trespass Upon Servient Lands).
W74-02808 6E

SPAWNING
Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

SPECIFIC CONDUCTIVITY
Comparative Transpiration Studies of Some Cape Proteas,
W74-02908 2D

SPECIFIC HUMIDITY
The Content of Water Vapour in the Atmosphere Over Southern Africa,
W74-02913 2B

SPECTROPHOTOMETRY
Determination of Furfural in Water and Asphalt (In Polish),
W74-02798 5A

SPECTROSCOPY
Fluorescent Spectroscopy, A Technique for Characterizing Surface Films,
W74-02731 5A

A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

SPIN-ECHO APPARATUS
Pulsed Nuclear Magnetic Resonance Studies of Porosity, Movable Fluid, and Permeability of Sandstones,
W74-03166 8G

SPOILAGE
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

SPRAY IRRIGATION
The Muskegon County Plan of Waste Water Reuse.
W74-02846 5D

SPRAYING
Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

SPRUCE TREES
Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

ST. LOUIS (MISSOURI)
Application and Operation of Sludge Incineration,
W74-02849 5E

STANDARDS
Water Use for Aquatic Life,
W74-02865 5C

Evaluation of the Tennessee Water Supply Program, Summary.
W74-03158 5G

STATE GOVERNMENTS
A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

STATISTICAL METHODS
Statistical Problems in Snow Mechanics,
W74-02745 2C

Use of Censored Data in the Estimation of Gumbel Distribution Parameters for Annual Maximum Flood Series,
W74-02763 2E

Cross Correlation of the Logarithms of Estimates of Mean Streamflows,
W74-02775 2E

Statistical Analysis of Biological Data from Preoperational-Postoperational Industrial Water Quality Monitoring,
W74-02993 5A

STATISTICAL MODELS
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

A Statistical Approach to Dynamic Modeling and Control of Water Distribution Systems,
W74-02673 4A

STATISTICS
Statistical Problems in Snow Mechanics,
W74-02745 2C

Use of Censored Data in the Estimation of Gumbel Distribution Parameters for Annual Maximum Flood Series,
W74-02763 2E

Cross Correlation of the Logarithms of Estimates of Mean Streamflows,
W74-02775 2E

STEAM
Free Convection Film Condensation of Steam in the Presence of Non-Condensing Gases,
W74-02896 8B

STEAMFLOW
Cross Correlation of the Logarithms of Estimates of Mean Streamflows,
W74-02775 2E

STEEL MILLSM *PIPING COMPANIES
Lake Michigan Discharge Studies.
W74-02954 5B

STIMULUS RESPONSE
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

STOCHASTIC PROCESSES
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

A Water Quality Simulation Model,
W74-02683 5B

The Economic Effects of Floods. Investigations of a Stochastic Model of Rational Investment Behavior in the Face of Floods,
W74-03193 6A

STORAGE COEFFICIENT
Planning and Analysis of Pulse-Tests,
W74-03164 2F

STORM DRAINS
Unsteady Flow in Sewer Networks,
W74-03095 5D

STORM RUNOFF
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

STORM SEWER NETWORKS
Unsteady Flow in Sewer Networks,
W74-03095 5D

STORMS
Hurricane Surge Frequency Estimated for the Gulf Coast of Texas,
W74-02700 2L

Coastal Storms of the Eastern United States,
W74-03098 2B

The Great Atlantic Coast Tides of 5-8 March 1962,
W74-03099 2J

STRAIT OF JUAN DE FUCA
Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

STREAMFLOW
Parametric Determination of Minimum Streamflow for Trout,
W74-02670 8I

Temperature of Missouri Streams,
W74-02885 2K

Surface Water Supply of the United States, 1966-70--Part 6. Missouri River Basin: Volume 2. Missouri River Basin from Williston, North Dakota, to Sioux City, Iowa.
W74-03035 7C

STREAMFLOW FORECASTING
Comparison of Methods of Deriving Unit Hydrographs,
W74-02828 2E

STREAMS
Role of Depth of Channel Downcutting in the Formation of Low Flow in Mountain Streams (Rol' glubiny vreza rusel v formirovanii mazhennogo stoka gornykh rek),
W74-02753 2E

North Georgia Petroleum Company V. Lewis (Action by Property Owner Seeking Damages for Pollution of Water Supply and by Station Operator Against Gasoline Company for Loss of Profits).
W74-02818 6E

Temperature of Missouri Streams,
W74-02885 2K

Atmospheric Reaeration Capacity of Streams. Part I. Critical Review of Methods Available to Measure and to Calculate the Atmospheric Reaeration Rate Constant,
W74-02916 5C

Atmospheric Reaeration Capacity of Streams. Part II. Direct Measurement of the Atmospheric Reaeration Rate Constant in the Upper Raritan River Basin,
W74-02917 5C

STRENGTH
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

STRESS
Material Property and Boundary Condition Effects on Stresses in Avalanche Snowpacks,
W74-02743 2C

Physical Properties of some Typical Foundation Rocks.
W74-03145 8E

SUDAN
Burning as a Supporting Treatment in Controlling Waterhyacinth in the Sudan. Part I. Routine Burning,
W74-02918 4A

Burning as a Supporting Management in the Control of Waterhyacinth in the Sudan. Part II. Backburning,
W74-02919 4A

SULFIDES
Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

SULFOLOBUS ACIDOCALDARIUS
Survival of Bacteria in Extreme Environments,
W74-02962 5C

SULFUR
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

SULFUR BACTERIA
Survival of Bacteria in Extreme Environments,
W74-02962 5C

SURFACE DRAINAGE
Pierce V. De Jong (Action by Owners of Dominant Estate Against Owners of Servient Estate for Damages for Obstruction of Natural Flow of Surface Waters).
W74-02806 6E

Southern Mutual Investment Corporation V. Langston (Suit for Damages Resulting from Diversion of Surface Waters).
W74-02807 6E

Clemson University V. First Provident Corporation (Suit to Enjoin Trespass Upon Servient Lands).
W74-02808 6E

SURFACE WATER
Southern Mutual Investment Corporation V. Langston (Suit for Damages Resulting from Diversion of Surface Waters).
W74-02807 6E

SURFACE WATERS
Water Resources Data for Colorado, 1972: Part 1. Surface-Water Records.
W74-02724 7C

Water Resources of the Ponce Area, Puerto Rico,
W74-03038 4A

Fractionation and Characterization of Natural Organic Matter from Certain Rivers and Soils by FreerFlow Electrophoresis,
W74-03062 2K

SURFACTANTS
Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

SURGE PRESSURES
Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

SURGES
Hurricane Surge Frequency Estimated for the Gulf Coast of Texas,
W74-02700 2L

Application of the Implicit Method to Surges in Open Channels,
W74-02767 2E

SURVEYS
Tidal Current Surveys by Photogrammetric Methods,
W74-02707 2L

SURVIVAL
Survival of Bacteria in Extreme Environments,
W74-02962 5C

SUSPENDED LOAD
The Adsorption of Rhodamine-B on to Materials Carried in Suspension by Inshore Waters,
W74-02721 5B

SUSPENDED SOLIDS
Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

SWABBING
Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

SWEDEN (LAKE STRAKEN)
A Microbenthos Study of Rotatoria,
W74-02893 2H

SYSTEMATICS
Russian-Thistle (Salsola) Species in Western United States,
W74-02945 4A

On the Systematics and Ecology of the Genus Chamesiphon (Cyanophyceae). 2. Ecology (Zur Systematik und Okologie det Gattung Chamesiphon (Cyanophyceae) 2. Okologie),
W74-02952 5C

SYSTEMS ANALYSIS
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

The Rise and Fall of Natural Resource Systems,
W74-02786 6E

Master Water Plan, Las Vegas Valley, (With Map Supplement).
W74-03117 6D

TANTOG
Influence of Temperature on Energy Utilization of Embryonic and Prolarval Tautog, Tautoga onitis,
W74-02872 5C

TAPEWORMS (CARYOPHYLLID)
*TENNESSEE
Two New Species of Caryophyllid Tapeworms from Catostomid Fishes in Tennessee,
W74-02995 2I

TARIFFS
The 200 Miles Fishing Rights Controversy: Ecology or High Tariffs,
W74-03200 6E

TASTE
The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

TEMPERATE
Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

TEMPERATURE
Surface Circulation of Lakes and Nearly Land-Locked Seas,
W74-02715 2H

Temperature Trends and the Distribution of Groundfish in Continental Shelf Waters, Nova Scotia to Long Island,
W74-02867 5C

Characteristics of Steam Electric Condenser Cooling Waters,
W74-02869 5B

Influence of Temperature on Energy Utilization of Embryonic and Prolarval Tautog, Tautoga onitis,
W74-02872 5C

Biochemical Effects of Temperature and Nutritive Stress on Mytilus edulis L,
W74-02873 5C

Effects of Thermal Additions from the Yellowstone Geyser Basins on the Bacteriology of the Firehole River,
W74-02895 5B

TEMPERATURES
Temperature of Missouri Streams,
W74-02885 2K

TENNESSEE
Water Pollution--The Tennessee Response; Conclusions and Generalizations,
W74-02794 6E

Comprehensive Water and Sewer Study, Hamilton, Walker, and Catoosa Counties, (Book Two).
W74-02833 5D

Flood Plain Information for Harris Fork Creek and South Fulton Branch, Fulton, Kentucky and South Fulton, Tennessee.
W74-03125 4A

Evaluation of the Tennessee Water Supply Program, Summary.
W74-03158 5G

TENNESSEE RIVER
Comprehensive Water and Sewer Study, Hamilton, Walker, and Catoosa Counties, (Book Two).
W74-02833 5D

TERBUTRYNE
Differential Tolerance of Six Leguminous Crops to Terbutryne,
W74-02941 3F

TERRADYNAMICS
Terradynamics,
W74-03165 8E

TERTIARY TREATMENT
The Muskegon County Plan of Waste Water Reuse.
W74-02846 5D

TEST-WELL DRILLING
Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

TESTING PROCEDURES
Planning and Analysis of Pulse-Tests,
W74-03164 2F

TEXAS
Hurricane Surge Frequency Estimated for the Gulf Coast of Texas,
W74-02700 2L

Gulf Holding Corp. V. Brazoria County (Order Enjoining Landowner from Obstructing Public Use of Beach).
W74-02805 6E

Regional Wastewater Development Plan, Water Quality Planning.
W74-02830 5D

Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

THAILAND
Pa Mong Stage one Feasibility Report. Appendix VI. Economic, Agricultural, Social and Financial Analysis.
W74-02686 6B

Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

THAILAND (YOM BASIN)
Ground Water in Thailand,
W74-03150 4B

THEORETICAL ANALYSIS
Free Convection Film Condensation of Steam in the Presence of Non-Condensing Gases,
W74-02896 8B

Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

THERMAL CAPACITY
Determination of the Heat Capacity of Lake Kariba,
W74-02910 2H

THERMAL EFFICIENCY
MHD Central Power: A Status Report,
W74-02871 5B

HERMAL POLLUTION
An Annual Plankton Cycle on the Chesapeake Bay in the Vicinity of Calvert Cliffs, Maryland, June 1969 - May, 1970,
W74-02863 5C

Calefaction of the Connecticut River, U.S.A.,
W74-02864 5B

Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

Characteristics of Steam Electric Condenser Cooling Waters,
W74-02869 5B

The Realities of Thermal Pollution - Environmental Limitations and Ecological Adaptations,
W74-02870 5C

The Legal and Regulatory Framework for Thermal Discharge from Nuclear Power Plants,
W74-02875 5G

Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

Observations on the Response of Some Benthonic Organisms to Power Station Cooling Water,
W74-02881 5C

Power Plant Effluent - Thermal Pollution or Energy at a Bargain Price,
W74-02888 5B

Environmental Challenges and Nuclear Fuels,
W74-02892 5B

Effects of Thermal Additions from the Yellowstone Geyser Basins on the Bacteriology of the Firehole River,
W74-02895 5B

Variation in Results of Identical Bioassays of Minnows Subjected to Instant Temperature Increase,
W74-02898 5C

Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

Observations on the Reactions of Young American Shad to a Heated Effluent,
W74-02900 5C

Chesapeake Bay Model Study for Calvert Cliffs,
W74-02905 5B

THERMAL POWER PLANTS
The Cooling Water of Power Stations: A New Factor in the Environment of Marine and Fresh-Water Invertebrates,
W74-02879 5C

Observations on the Response of Some Benthonic Organisms to Power Station Cooling Water,
W74-02881 5C

THERMAL POWERPLANTS
MHD Central Power: A Status Report,
W74-02871 5B

Chesapeake Bay Model Study for Calvert Cliffs,
W74-02905 5B

THERMAL PROPERTIES
The Measurement of the Heat of Reaction Between Proteins and Clay Minerals by Microcalorimetry,
W74-02669 2G

Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

THERMAL RADIATION
Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

THERMAL SPRINGS
Effects of Thermal Additions from the Yellowstone Geyser Basins on the Bacteriology of the Firehole River,
W74-02895 5B

THERMAL TOLERANCE
Respiration and Thermal Tolerance of Phyllopod Crustacea Triops longicaudatus and Thamnocephalus platyurus Inhabiting Desert Ephermeral Ponds,
W74-03090 2H

THERMOCLINE
The Surface Waters off the Coast of Kerala, South-West India,
W74-03103 2E

THERMODYNAMICS
Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

THERMOGRAVIMETRIC ANALYSIS
Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

THERMOPHILIC ALGAE
Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

THERMOPHILIC BACTERIA
Survival of Bacteria in Extreme Environments,
W74-02962 5C

THIN FILMS
The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

THRAUSTOCHYTRIUM-STRIATUM
Lower Fungi as Test Organisms of Pollutants in Sea and Brackish Water: The Effects of Heavy Metal Compounds and Phenol on Thraustochytrium striatum (In German),
W74-02696 5C

TICKS
A Horizontal Distribution of Oribatids in Exhausted Peat-Bogs of the Balachninskaya Lowland, (In Russian),
W74-02820 2H

TIDAL CURRENTS
A Study of Water Circulation in Monterey Harbor Using Rhodamine B Dye,
W74-03114 2L

TIDAL EFFECTS
The Effects of Water Table and Tide Cycle on Swash-Backwash Sediment Distribution and Beach Profile Development,
W74-02716 2J

The Great Atlantic Coast Tides of 5-8 March 1962,
W74-03099 2J

A Study of Water Circulation in Monterey Harbor Using Rhodamine B Dye,
W74-03114 2L

TIDAL STREAMS
Residual Currents in Relation to Shoreline Evolution of the East Anglian Coast,
W74-02720 2J

TIDAL WATERS
Characteristics of Steam Electric Condenser Cooling Waters,
W74-02869 5B

TIDES
Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

Tidal Current Surveys by Photogrammetric Methods,
W74-02707 2L

TILE DRAINAGE
A Flow Path Ground Water Sampler,
W74-03126 7B

TIME LAG
Mean Rainfall and Mean Runoff in South Africa; an Investigation into Phase Differences,
W74-02909 2A

TIME SERIES ANALYSIS
Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume I, Time Series Analysis in Water Quality Modeling,
W74-02823 5B

TIME SERIES ANALYSIS MATHEMATICAL MODELS
Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume II, Nonlinear Filtration and Estimation in Water Quality Modeling,
W74-02824 5B

TITRATE
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

TOXICITY
Water Quality Criteria for European Freshwater Fish. Reoprt on Ammonia and Inland Fisheries.
W74-02951 5C

Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

Effect of Hydrolysis Plant Effluents on Fish (Vliyanne na ryb stochnykh vod gidroliznogo zavoda),
W74-03074 5C

TOXICITY

Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

Biological Surveys: Intent, Methodology, Interpretation,
W74-03086 5C

TOXINS

A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

TRACE ELEMENTS

Trace Metals in a Tundra Pond: Variations in Concentration and Their Effect on Phytoplankton Populations,
W74-02726 2H

The Influence of Dissolved Humic Substances on Trace Metal Phototoxicity,
W74-02727 2H

Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

TRACERS

Geochronological Studies in Santa Barbara Basin: Fe-55 as a Unique Tracer for Particulate Settling,
W74-02722 2J

Dispersion of Pollutants in Saturated Porous Media,
W74-03093 5B

Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

TRAINING

Instrumental Analysis of Chemical Pollutants--Training Manual.
W74-02739 5A

TRANSMISSIVITY

Planning and Analysis of Pulse-Tests,
W74-03164 2F

TRANSPIRATION

Forest Transpiration Greatly Speeds Streamflow Recession,
W74-02766 2D

Comparative Transpiration Studies of Some Cape Proteas,
W74-02908 2D

TREATMENT FACILITIES

Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

Sewerage Facilities Plan, in Accordance with the Pennsylvania Sewerage Act (537).
W74-02832 5D

Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

Wastewater Cleanup Equipment.
W74-03082 5D

Effluent Treatment Plants in the Forest Products Industry (Puunjalostusteollisuuden jatevesipuhdistamot),
W74-03087 5D

A German Filter Belt Press (La Siebbandpresse),
W74-03088 5D

An Economic Feasibility Study of Fayetteville, North Carolina, Treating Fort Bragg's Wastewater,
W74-03187 5D

TRIAXIAL COMPRESSION TESTS

Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

TRICKLING FILTERS

Design Optimization for Biological Filter Models,
W74-02679 5D

The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

TRITIUM TRACER STUDIES

Designing for Future Expansion-Development of Ground Water in India,
W74-03151 4B

TROPHIC LEVEL

Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

TROUT

Parametric Determination of Minimum Streamflow for Trout,
W74-02670 8I

TULSA (OKLA)

The Identification and Measurement of Chlorinated Hydrocarbon Pesticides Accumulated From Urban Runoff,
W74-02665 5A

TUNNEL CONSTRUCTION

The Jacking Method in Tunnel Construction,
W74-02855 8A

TUNNELING

The Jacking Method in Tunnel Construction,
W74-02855 8A

TUNNELING MACHINES

The Jacking Method in Tunnel Construction,
W74-02855 8A

TURBULENCE

Turbulent Heat Transfer and the Periodic Viscous Sublayer,
W74-02884 8B

TURBULENT FLOW

Calculation of Heat Transfer in Turbulent Flow with Allowance for Secondary Flow,
W74-02904 8B

TURKEY

Water Requirements of Various Crops in Arid and Semi-Arid Zones of Turkey,
W74-02937 3F

TYRRHENIAN SEA

First Experimental Results on the Diffusion of Fresh Water in a shallow bay,
W74-03100 2L

ULTIMATE DISPOSAL

Burning as a Supporting Treatment in Controlling Waterhyacinth in the Sudan. Part I. Routine Burning,
W74-02918 4A

ULTRASONICS

Ultrasonic Emissions in Snow,
W74-02741 2C

ULTRASTRUCTURE

Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

UNDERFLOW

Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

UNDERGROUND CONSTRUCTION

The Jacking Method in Tunnel Construction,
W74-02855 8A

UNDERGROUND STORAGE

Problems of Underground Storage of Wastes,
W74-02732 5B

Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

UNDERGROUND STRUCTURES

The Jacking Method in Tunnel Construction,
W74-02855 8A

UNDERGROUND WASTE DISPOSAL

Problems of Underground Storage of Wastes,
W74-02732 5B

UNITED STATES

Stream Channelization (Part 5).
W74-02777 6G

The Federal Water Pollution Control Act Amendments of 1972: Ambiguity as a Control Device,
W74-02784 6E

A Bill to Authorize the Secretary of the Army to Investigate, Plan, and Construct Projects for the Control of Streambank Erosion.
W74-02789 6E

Federal Legislation Regarding Marine Pollution,
W74-02795 6E

Marine Protection, Research, and Sanctuaries Act of 1972.
W74-02797 6E

UNIVERSITIES

An Inventory of Environmental Resources Research in Progress, Colorado State University.
W74-03133 6G

The University and Public Policy in Water Resources, Proceedings UCOWR Annual Meeting held July 29-August 1, 1973 at Texas Tech University, Lubbock, Texas.
W74-03172 6B

Implications of the National Water Commission Report for the Universities Council on Water Resources,
W74-03173 6B

Comments on the Report of the National Water Commission,
W74-03174 6B

Opportunities for Regional Coordination and Cooperation in Water Resources Research,
W74-03175 6B

Regional Research Opportunities under EPA Sponsorship,
W74-03176 6B

Highlights and Issues of the 1972 Amendments to the Federal Water Pollution Control Act,
W74-03180 6B

NIVERSITIES COUNCIL ON WATER ESOURCES
Implications of the National Water Commission Report for the Universities Council on Water Resources,
W74-03173 6B

NSATURATED FLOW
Unsaturated Flow Properties Used to Predict Outflow and Evapotranspiration from a Sloping Lysimeter,
W74-02771 2D

NSTEADY FLOW
Unsteady Flow in Sewer Networks,
W74-03095 5D

PWELLING
A Numerical Model of Coastal Upwelling,
W74-02713 2E

Surface Circulation of Lakes and Nearly Land-Locked Seas,
W74-02715 2H

Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

RANIUM RADIOISOTOPES
Incorporation of Uranium in Modern Corals,
W74-03064 2K

RBAN HYDROLOGY
Unsteady Flow in Sewer Networks,
W74-03095 5D

RBANIZATION
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

SE-PRIORITY SYSTEM
San Diego's Offshore Area,
W74-02831 6F

SER CHARGES
A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

SSR
All-Union Conference on Use and Conservation of Water Resources (Vsesoyuznoye soveshchaniye po ispol'zovaniyu i okhrane vodnykh resursov),
W74-02748 6B

Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

A Morphometric Description of Lake Issyk-Kul' (Morformetricheskaya kharakteristika ozera Issyk-Kul'),
W74-02755 2H

Karst Waters of the Caucasus (Karstovyye vody Bol'shogo Kavkaza),
W74-02756 2E

Hydrography and Water Resources of Australia (Gidrografiya i vodnyye resursy Avstralii),
W74-02757 6B

USSR (BALACHNINSKAYA LOWLAND)
A Horizontal Distribution of Oribatids in Exhausted Peat-Bogs of the Balachninskaya Lowland, (In Russian),
W74-02820 2H

USSR (KULANDA)
Higher Water Vegetation and Its Fauna of Krotowaya Laga and Kusgan Lakes (North Kulanda), (In Russian),
W74-02901 2H

USSR (NORTH KAZAKHSTAN)
Construction of a Map of Average Annual Runoff for North Kazakhstan (Postroyeniye karty normy stoka Severnogo Kazakhstana),
W74-02751 2E

USSR (PAMIRS-TIEN SHAN)
Role of Depth of Channel Downcutting in the Formation of Low Flow in Mountain Streams (Rol' glubiny vreza rusel v formirovanii mazhennogo stoka gornykh rek),
W74-02753 2E

USSR (UKRAINE)
Conservation of Water Resources and Their Rational Use in the National Economy (Okhrana vodnykh resursov i ikh ratsional'noye ispol'zovaniye v narodnom khozyaystve),
W74-02749 5D

UTILITIES
Industrial and High Velocity Metering,
W74-02858 5F

UTILITY SYSTEMS INVENTORY
Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

UZBEKISTAN (USSR)
Loss of Nitrogen from Various Nitrogen Fertilizers on Irrigated Land,
W74-02936 3F

VAPOR LOSS
Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

VEGETATION
Plant Species as Wildlife Cover and Erosion Control on 'Mudflats' in Iowa's Lareg Reservoir Systems,
W74-02666 4D

Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

Geobotanical Processes in the Saskatchewan River Delta,
W74-02866 2I

VEGETATION REGROWTH
Partial Recovery of a Vegetation in a Pollution Damaged Marsh,
W74-02663 5C

Small Mammals Increase on Recently Cleared and Seeded Juniper Rangeland,
W74-02938 4A

VIBRIO MARINUS
Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

VIBRIO-PARAHAEMOLYTICUS
Incidence of Vibrio parahaemolyticus in Shellfish from Eight Canadian Atlantic Sampling Areas,
W74-03185 5A

VIRGIN ISLANDS
Harthman V. Witty (Appeal from District Court Order Denying Motion for Assessment of Damages Against Shopping Center for Violation of Injunction Against Pollution of Stream).
W74-02809 6E

Red Hook Marina Corporation V. Antilles Yachting Corporation (Action to Recover Unpaid Balance on Note and to Foreclose Purchase Money Mortgage).
W74-02811 6E

VIRGINIA
Rotenone Methods in a Large River System,
W74-02736 8I

Chincoteague Inlet, Navigation Project, Accomack County, Virginia (Final Environmental Statement).
W74-02800 8A

Forest Management on the Watershed,
W74-03129 4C

VISCOSITY
Turbulent Heat Transfer and the Periodic Viscous Sublayer,
W74-02884 8B

VISCOUS DRAG
Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

VOLATILITY
A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

VOLCANOES
Antidune and Chute and Pool Structures in the Base Surge Deposits of the Laacher See Area, Germany,
W74-03063 2J

WASHINGTON
Water quality Management Plan for the Green and Cedar River Basins in the State of Washington: Progress Report for Fiscal Year Ending June 30, 1972.
W74-02842 5D

Pacific Salmon Aquaculture Program--Incubation and Cultivation Phases,
W74-03028 2L

Predation, Particularly by Sculpins, on Salmon Fry in Fresh Waters of Washington,
W74-03058 2I

Checklist of Puget Sound Fishes,
W74-03060 2L

Final Environmental Impact Statement for Modification of a Boat Dock and Ramp.
W74-03124 6G

WASTE DISPOSAL
Optimal Control of Nitrogen Losses from Land Disposal Areas,
W74-02677 5B

Process of Removing Water from Slimes,
W74-03007 5G

System for Survellance of Ocean Dumping
W74-03021 5G

A Bill to Amend the Act of March 3, 1899, Commonly Referred to as the Refuse Act Relating to the Issuance of Certain Permits.
W74-03134 6E

WASTE DISPOSAL WELLS
Problems of Underground Storage of Wastes,
W74-02732 5B

WASTE DUMPS
Marine Protection, Research, and Sanctuaries Act of 1972.
W74-02797 6E

WASTE STORAGE
Problems of Underground Storage of Wastes,
W74-02732 5B

WASTE TREATMENT
Waste Treatment for Small Flows,
W74-02723 5D

WASTE WATER DISPOSAL
Evaluation of Alternates for Water Pollution Control and Resource Management: Phase III, Pollution Abatement Project, Las Vegas Wash and Bay, Annex C.
W74-02834 5D

A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

Environmental Assessment; Pollution Abatement Project, Las Vegas Wash and Bay, Annex B.
W74-03118 5D

WASTE WATER (POLLUTION)
Biological Surveys: Intent, Methodology, Interpretation,
W74-03086 5C

WASTE WATER TREATMENT
Catalytic Oxidation of Organics in Wastewater,
W74-02655 5D

Individual Home Aerobic Wastewater Treatment Systems,
W74-02668 5D

Design Optimization for Biological Filter Models,
W74-02679 5D

Waste Treatment for Small Flows,
W74-02723 5D

Conservation of Water Resources and Their Rational Use in the National Economy (Okhrana vodnykh resursov i ikh ratsional'noye ispol'zovaniye v narodnom khozyaystve),
W74-02749 5D

Pollution Abatement Project, Bandelier National Monument, New Mexico (Final Environmental Impact Statement).
W74-02801 5D

Regional Wastewater Development Plan, Water Quality Planning.
W74-02830 5D

Sewerage Facilities Plan, in Accordance with the Pennsylvania Sewerage Act (537).
W74-02832 5D

Evaluation of Alternates for Water Pollution Control and Resource Management: Phase III, Pollution Abatement Project, Las Vegas Wash and Bay, Annex C.
W74-02834 5D

Planning for Water Resue,
W74-02845 5D

The Muskegon County Plan of Waste Water Reuse.
W74-02846 5D

Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

The Full-Scale Refinement of Purified Sewage for Unrestricted Industrial use in the Manufacture of Fully Bleached Kraft-Pulp and Fine Paper,
W74-02906 5D

Indirector Chlorinator,
W74-02999 5D

Thermolytic Sewage System,
W74-03001 5D

Slurry Concentrator and Filter Apparatus,
W74-03003 5D

Continuously Regenerating Active Earth Filtering Apparatus for Liquid wastes,
W74-03004 5D

Filter Bottom and Molded Module Therefor,
W74-03006 5D

Apparatus for Separating Paint or the Like from Water,
W74-03008 5D

Method for Treating Sewage,
W74-03012 5D

Sewage Treatment Vessel,
W74-03016 5D

Surface Aerator Having Wave Attenuator,
W74-03018 5D

Granular to Powdered Activated Carbon in Polluted Water Purification Process,
W74-03019 5D

Oil Removal from Waste Waters,
W74-03020 5D

The Liquid Waste Facilities Function Concept.
W74-03039 5D

The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

Characterization of Sulfite Pulp Bleaching Effluents and Their Behavior During Biodegradation (Abwassertechnische Charakterisierung von Sulfitzellstoffbleicherei-Abwassern und deren Verhalten beim biologischen Abbau),
W74-03073 5D

Color Removal and Sludge Recovery from Total Mill Effluent,
W74-03077 5D

Wastewater Cleanup Equipment.
W74-03082 5D

Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

Effluent Treatment Plants in the Forest Products Industry (Puunjalostusteollisuuden jatevesipuhdistamot),
W74-03087 5D

A German Filter Belt Press (La Siebbandpresse),
W74-03088 5D

A New Step Toward Waste Water Treatment (Un nouveau pas vers le traitement des eaux usees).
W74-03089 5D

EPA Readies Farm Antipollution Guidelines.
W74-03128 5D

An Economic Feasibility Study of Fayetteville, North Carolina, Treating Fort Bragg's Wastewater,
W74-03187 5D

WATER
Rural Water Districts.
W74-02813 6B

WATER ALLOCATION (POLICY)
The Idaho System for the Distribution of Water Among Its Appropriators: An Examination and Assessment,
W74-02793 6E

San Diego's Offshore Area,
W74-02831 6F

Oregon's Long-Range Requirements for Water.
W74-03119 6D

Economic Policy for Water Resources and Placement Flows,
W74-03191 4B

WATER ANALYSIS
Trace Metals in a Tundra Pond: Variations in Concentration and Their Effect on Phytoplankton Populations,
W74-02726 2H

The Influence of Dissolved Humic Substances on Trace Metal Phototoxicity,
W74-02727 2H

Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

Electrochemical Measurement of Zinc in Organic-Rich Water,
W74-02729 2H

Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

WATER BALANCE
Construction of a Map of Average Annual Runoff for North Kazakhstan (Postroyeniye karty normy stoka Severnogo Kazakhstana),
W74-02751 2E

A Study of Evapotranspiration from a Douglas Fir Forest Using the Energy Balance Approach,
W74-02764 2D

WATER CHEMISTRY
Determination of the Association and Dissociation of Humic Acid Fractions by Small Angle X-Ray Scattering,
W74-02730 2K

The Ionic Activity Function of Water and the Activity Coefficient of the Hydrogen Ion in Seawater,
W74-02760 1B

WATER CIRCULATION
A Numerical Model of Coastal Upwelling,
W74-02713 2E

Surface Circulation of Lakes and Nearly Land-Locked Seas,
W74-02715 2H

On the Mean Drift in Large Lakes,
W74-02762 2H

A Study of Water Circulation in Monterey Harbor Using Rhodamine B Dye,
W74-03114 2L

WATER CONSERVATION
A Study of the Optimal Mix of Private and Public Action for Local and Regional Water Conservation,
W74-02654 6B

All-Union Conference on Use and Conservation of Water Resources (Vsesoyuznoye soveshchaniye po ispol'zovaniyu i okhrane vodnykh resursov),
W74-02748 6B

Conservation of Water Resources and Their Rational Use in the National Economy (Okhrana vodnykh resursov i ikh ratsional'noye ispol'zovaniye v narodnom khozyaystve),
W74-02749 5D

Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974.
W74-02780 6E

Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

What About Water.
W74-03135 6E

WATER CONTROL
Water-Works in Cities of Specified Classes of Populations.
W74-02802 6E

WATER DEMAND
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

Hillsborough County, Florida: Population Projections and Environmental Factors.
W74-02838 6D

Land Use and Water Resources,
W74-03024 2A

The Ocean Edge of San Diego,
W74-03120 6D

WATER DISPOSAL
Variation in Results of Identical Bioassays of Minnows Subjected to Instant Temperature Increase,
W74-02898 5C

WATER DISTRIBUTION
Master Water Plan, Las Vegas Valley, (With Map Supplement).
W74-03117 6D

WATER DISTRIBUTION (APPLIED)
A Statistical Approach to Dynamic Modeling and Control of Water Distribution Systems,
W74-02673 4A

The Denver System of Controls,
W74-02854 5F

WATER DISTRICTS
Rural Water Districts.
W74-02813 6E

WATER EQUIVALENT
Snow Survey Measurements Through 1970,
W74-02738 2C

WATER HARVESTING
Survey of Rain Run-Off Harvesting,
W74-02915 3B

WATER HYACINTH
Burning as a Supporting Treatment in Controlling Waterhyacinth in the Sudan. Part I. Routine Burning,
W74-02918 4A

Burning as a Supporting Management in the Control of Waterhyacinth in the Sudan. Part II. Backburning,
W74-02919 4A

Effect of pH and High Phosphorus Concentrations on Growth of Waterhyacinth,
W74-02934 5C

Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

WATER LAW
Federally Reserved Rights to Underground Water-A Rising Question in the Arid West,
W74-02792 6E

A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

WATER LEVELS
Computing the Barometric Efficiency of a Well,
W74-03167 8B

WATER LOSS
Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

WATER MANAGEMENT (APPLIED)
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

Diversion of Flood Flows from the Connecticut River and the Effect on Groundwater Supplies,
W74-02847 4B

Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

Annual Report, '71-'72.
W74-03092 5G

Economic and Social Purposes Related to Water Management,
W74-03197 6B

WATER MANAGEMENT OBJECTIVES
Economic and Social Purposes Related to Water Management,
W74-03197 6B

WATER MEASUREMENT
Industrial and High Velocity Metering,
W74-02858 5F

WATER POLICY
Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974.
W74-02780 6E

Water-Resources Planning,
W74-02843 6B

Evaluation of the Tennessee Water Supply Program, Summary.
W74-03158 5G

Water Resources Policy Issues Related to Agriculture,
W74-03182 6B

Economic Policy for Water Resources and Placement Flows,
W74-03191 4B

WATER POLLUTION
Federal Legislation Regarding Marine Pollution,
W74-02795 6E

United States V. Kentland-Elkhorn Coal Corporation (Injunctive Relief Sought Against Defendant to Cause Cessation of Blackwater Discharge into Federally protected Waters).
W74-02815 6E

Lake Skaneateles--Sewage, Garbage Dumping Prohibited.
W74-02817 6E

WATER POLLUTION

North Georgia Petroleum Company V. Lewis (Action by Property Owner Seeking Damages for Pollution of Water Supply and by Station Operator Against Gasoline Company for Loss of Profits).
W74-02818 6E

Disposal of Waste Materials at Sea.
W74-02819 6E

Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

WATER POLLUTION CONTROL

The Federal Water Pollution Control Act Amendments of 1972: Ambiguity as a Control Device,
W74-02784 6E

The Federal Water Pollution Control Act Amendments of 1972.
W74-02785 6E

Missouri Clean Water Law.
W74-02787 6E

Water Pollution--The Tennessee Response; Conclusions and Generalizations,
W74-02794 6E

U.S. V. Valley Camp Coal Company (Violation of Federal Statute Prohibiting Discharge of Refuse Matter into Navigable Waters).
W74-02810 6E

Disposal of Waste Materials at Sea.
W74-02819 6E

Evaluation of Alternates for Water Pollution Control and Resource Management: Phase III, Pollution Abatement Project, Las Vegas Wash and Bay, Annex C.
W74-02834 5D

An Overview of Maryland's Sediment Control Program,
W74-02852 5G

Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

4 Water Pollution, Environmental Enhancement Study.
W74-02856 5G

System for Survellance of Ocean Dumping
W74-03021 5G

U. S. Coast Guard Oil Pollution Investigation and Control School, Investigator's Manual.
W74-03027 5G

The Liquid Waste Facilities Function Concept.
W74-03039 5D

Annual Report, '71-'72.
W74-03092 5G

Environmental Assessment; Pollution Abatement Project, Las Vegas Wash and Bay, Annex B.
W74-03118 5D

Need to Improve Administration of the Water Pollution Research, Development, and Demonstration Program.
W74-03131 5G

Water Quality Issues in the National Water Commission's Report 'Water Policies for the Future',
W74-03179 6B

WATER POLLUTION EFFECTS

4 Water Pollution, Environmental Enhancement Study.
W74-02856 5G

Pollution of the 'El Carpincho' Pond (Pampasic Region, Argentina) and Its Effects on Plankton and Fish Communities,
W74-02923 5C

Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

Total Dissolved Electrolyte Effects on Periphyton,
W74-02990 5C

Statistical Analysis of Biological Data from Preoperational-Postoperational Industrial Water Quality Monitoring,
W74-02993 5A

Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

Effect of Hydrolysis Plant Effluents on Fish (Vliyanne na ryb stochnykh vod gidroliznogo zavoda),
W74-03074 5C

Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

Biological Surveys: Intent, Methodology, Interpretation,
W74-03086 5C

WATER POLLUTION SOURCES

The Identification and Measurement of Chlorinated Hydrocarbon Pesticides Accumulated From Urban Runoff,
W74-02665 5A

Problems of Underground Storage of Wastes,
W74-02732 5B

The Proposed International Compensation Fund for Oil Pollution Damage,
W74-02799 6E

Harthman V. Witty (Appeal from District Court Order Denying Motion for Assessment of Damages Against Shopping Center for Violation of Injunction Against Pollution of Stream).
W74-02809 6E

United States V. Kentland-Elkhorn Coal Corporation (Injunctive Relief Sought Against Defendant to Cause Cessation of Blackwater Discharge into Federally protected Waters).
W74-02815 6E

4 Water Pollution, Environmental Enhancement Study.
W74-02856 5G

Natural Habitat of Caryophanon latum,
W74-02966 5B

Escherichia coli Serogroups Isolated from Streams in Pennsylvania, 1965 to 1972,
W74-02988 5A

Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

WATER POLLUTION STANDARDS

The Federal Water Pollution Control Act Amendments of 1972: Ambiguity as a Control Device,
W74-02784 6E

WATER POLLUTION TREATMENT

Harthman V. Witty (Appeal from District Court Order Denying Motion for Assessment of Damages Against Shopping Center for Violation of Injunction Against Pollution of Stream).
W74-02809 6E

The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

WATER PURIFICATION

Apparatus for Separating Paint or the Like from Water,
W74-03008 5D

Dynamics Reverse Osmosis Membranes of Ultrathin Discs,
W74-03009 3A

WATER QUALITY

A Water Quality Simulation Model,
W74-02683 5B

Effects of Migratory Waterfowl on Water Quality at the Montezuma National Wildlife Refuge, Seneca County, New York,
W74-02733 5B

Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

Stream Channelization (Part 5).
W74-02777 6G

Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume I, Time Series Analysis in Water Quality Modeling,
W74-02823 5B

Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume II, Nonlinear Filtration and Estimation in Water Quality Modeling,
W74-02824 5B

Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

A Hydrologic Reconnaissance of the Pascagoula River Estuary, Mississippi,
W74-03094 2L

An Inventory of Environmental Resources Research in Progress, Colorado State University.
W74-03133 6G

Ground Water in Thailand,
W74-03150 4B

Evaluation of the Tennessee Water Supply Program, Summary.
W74-03158 5G

Storage and Retrieval of Water Quality Data--Training Manual.
W74-03171 5A

Water Quality Issues in the National Water Commission's Report 'Water Policies for the Future',
W74-03179 6B

ATER QUALITY CONTROL
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

The Federal Water Pollution Control Act Amendments of 1972.
W74-02785 6E

Annual Report, '71-'72.
W74-03092 5G

A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

ATER QUALITY MANAGEMENT
Regional Wastewater Development Plan, Water Quality Planning.
W74-02830 5D

Water Quality Management: New Jersey's Vanishing Options.
W74-02841 5G

ATER QUALITY STANDARDS
Missouri Clean Water Law.
W74-02787 6E

Water Use for Aquatic Life,
W74-02865 5C

Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

Water Quality Criteria for European Freshwater Fish. Reoprt on Ammonia and Inland Fisheries.
W74-02951 5C

Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

ATER REQUIREMENTS
Parametric Determination of Minimum Streamflow for Trout,
W74-02670 8I

Water Requirements of Various Crops in Arid and Semi-Arid Zones of Turkey,
W74-02937 3F

Oregon's Long-Range Requirements for Water.
W74-03119 6D

ATER RESOURCES
Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

All-Union Conference on Use and Conservation of Water Resources (Vsesoyuznoye soveshchaniye po ispol'zovaniyu i okhrane vodnykh resursov),
W74-02748 6B

Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

Hydrography and Water Resources of Australia (Gidrografiya i vodnyye resursy Avstralii),
W74-02757 6B

Water-Resources Planning,
W74-02843 6B

Water Resources of the Ponce Area, Puerto Rico,
W74-03038 4A

WATER RESOURCES COUNCIL
Water-Resources Planning,
W74-02843 6B

WATER RESOURCES DEVELOPMENT
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

Flood Control Project Planning by Mathematical Programming: A Project-Expansion Approach,
W74-02674 4A

The Rise and Fall of Natural Resource Systems,
W74-02786 6E

A Methodology for Assessing Environmental Impact of Water Resources Development.
W74-02822 6B

North Carolina Water Plan Progress Report: Chapter 19: Power and Water.
W74-02836 3D

Land Use and Water Resources,
W74-03024 2A

The California State Water Project Summary: Nineteen-Seventy-Two, Appendix C.
W74-03026 4A

Managing our Coastal Zone.
W74-03037 5G

The Ocean Edge of San Diego,
W74-03120 6D

What About Water.
W74-03135 6E

WATER RESOURCES PLANNING
Water-Resources Planning,
W74-02843 6B

WATER RESOURCES RESEARCH ACT
The University and Public Policy in Water Resources, Proceedings UCOWR Annual Meeting held July 29-August 1, 1973 at Texas Tech University, Lubbock, Texas.
W74-03172 6B

Implications of the National Water Commission Report for the Universities Council on Water Resources,
W74-03173 6B

Comments on the Report of the National Water Commission,
W74-03174 6B

Opportunities for Regional Coordination and Cooperation in Water Resources Research,
W74-03175 6B

WATER RESOURCES SCIENTIFIC INFORMATION
Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

WATER RETENTION
Effect of Drying on Water Retention of a Puddled Soil,
W74-03186 2G

WATER REUSE
Planning for Water Resue,
W74-02845 5D

The Muskegon County Plan of Waste Water Reuse.
W74-02846 5D

Reuse Irrigation Cuts Costs,
W74-03194 5D

WATER SAMPLER
A Flow Path Ground Water Sampler,
W74-03126 7B

WATER SOFTENING
Iron Removal Filter System,
W74-03002 5F

WATER SOURCES
Master Water Plan, Las Vegas Valley, (With Map Supplement).
W74-03117 6D

WATER STORAGE
Fog Drip from Artificial Leaves in a Fog Wind Tunnel,
W74-02765 2I

WATER SUPPLY
Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

Comprehensive Water and Sewer Study, Hamilton, Walker, and Catoosa Counties, (Book Two).
W74-02833 5D

Public Policy Alternatives Affecting Water and Sewer Service in Urban Growth Areas.,
W74-02835 3D

Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

Solids Waste Disposal.
W74-02840 5D

The Denver System of Controls,
W74-02854 5F

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania; Volume I--General, Sewerage Planning, Appendices.
W74-02861 6E

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania: Volume 2--Water Planning.
W74-02862 6E

Benthic Dredge Construction,
W74-03022 8C

Master Water Plan, Las Vegas Valley, (With Map Supplement).
W74-03117 6D

WATER SUPPLY

Functional Water and Sewer Report,
W74-03122 3D

Preservation of Reservoir Sites,
W74-03123 6F

WATER SUPPLY DEVELOPMENT

Water Supply and Sewage Facilities Plan Update--1970, Lehigh-Northampton Counties, Pennsylvania.
W74-02848 5D

WATER TABLE

The Effects of Water Table and Tide Cycle on Swash-Backwash Sediment Distribution and Beach Profile Development,
W74-02716 2J

WATER TEMPERATURE

Temperature Trends and the Distribution of Groundfish in Continental Shelf Waters, Nova Scotia to Long Island,
W74-02867 5C

Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

Effect on Organisms of Entrainment in Cooling Water: Steps Toward Predictability,
W74-02894 5C

Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

Observations on the Reactions of Young American Shad to a Heated Effluent,
W74-02900 5C

The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

Determination of the Heat Capacity of Lake Kariba,
W74-02910 2H

Water Quality Criteria for European Freshwater Fish. Reoprt on Ammonia and Inland Fisheries.
W74-02951 5C

WATER TREATMENT

Conservation of Water Resources and Their Rational Use in the National Economy (Okhrana vodnykh resursov i ikh ratsional'noye ispol'zovaniye v narodnom khozyaystve),
W74-02749 5D

Iron Removal Filter System,
W74-03002 5F

Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

WATER USERS

The Idaho System for the Distribution of Water Among Its Appropriators: An Examination and Assessment,
W74-02793 6E

WATER UTILIZATION

An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

All-Union Conference on Use and Conservation of Water Resources (Vsesoyuznoye soveshchaniye po ispol'zovaniyu i okhrane vodnykh resursov),
W74-02748 6B

Conservation of Water Resources and Their Rational Use in the National Economy (Okhrana vodnykh resursov i ikh ratsional'noye ispol'zovaniye v narodnom khozyaystve),
W74-02749 5D

Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

Water, Land, and Environment Imperial Valley: Law Caought Up in the Winds of Politics,
W74-03127 6E

WATER VAPOR

The Content of Water Vapour in the Atmosphere Over Southern Africa,
W74-02913 2B

WATER WELLS

Feasibility Study: Hydraulic Fracturing of Drilled Water Wells to Stimulate Their Yield,
W74-02659 8B

Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

Random Drilling for Water in Carbonate Rocks,
W74-03141 8B

Mutual Interference of Water Wells,
W74-03154 8B

Sealing Abandoned Water Wells.
W74-03169 8F

WATER YIELD

Water Resources Data for Colorado, 1972: Part 1. Surface-Water Records.
W74-02724 7C

Water Resources of the Ponce Area, Puerto Rico,
W74-03038 4A

Ground Water in Thailand,
W74-03150 4B

Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

WATER YIELD IMPROVEMENT

Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

Survey of Rain Run-Off Harvesting,
W74-02915 3B

WATERFOWL

Effects of Migratory Waterfowl on Water Quality at the Montezuma National Wildlife Refuge, Seneca County, New York,
W74-02733 5B

WATERSHED MANAGEMENT

River Basin Authorizations and Related Water Resource Projects.
W74-02781 4A

Forest Management on the Watershed,
W74-03129 4C

WATERSHEDS (BASINS)

Land Use and Water Resources,
W74-03024 2A

WATERTIGHT

Sealing Abandoned Water Wells.
W74-03169 8F

WAVE ACTION

Residual Currents in Relation to Shoreline Evolution of the East Anglian Coast,
W74-02720 2J

WAVE ENERGY

Wave Induced Oscillations in Harbors,
W74-02708 2L

Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2

WAVE RUN-UP

Water Wave Run-Up on a Beach,
W74-02698 2F

Feasibility of Modeling Run-up Effects o Dispersive Water Waves,
W74-03106 8I

Calculation of a Solitary Wave Shoaling on Shallow Slope,
W74-03115 8F

WAVE RUNUP

Wave Runup, Mono Lake Tests, 1965: A Summary of Theoretical Prediction Methods an Some Comparisons with Experimental Data,
W74-03113 2F

WAVES

The Southern Monterey Bay Littoral Cell: A Preliminary Sediment Budget Study,
W74-02695 2L

WAVES (WATER)

An Investigation of the Deformation an Breaking of Solitary Waves,
W74-02694 2L

Investigations of Marine Processes and Coasta Landforms Near Crescent City, California Volume I. Technical Discussion,
W74-02697 2L

Water Wave Run-Up on a Beach,
W74-02698 2L

Energy Measurements in the Swash-Surf Zone
W74-02702 2L

Coastal Sand Dunes of Guerrero Negro, Baj California, Mexico,
W74-02704 2L

Longshore Transport of Sand,
W74-02706 2

Wave Induced Oscillations in Harbors,
W74-02708 2L

Sea Waves in Coastal Waters of the British Isles,
W74-02710 2L

Deformation of Temporal Pattern of Orbital Wave Velocity and Sediment Transport in Shoaling Water, In Breaker Zone and on Foreshore,
W74-02711 2L

Breaker Type Classification on Three Laboratory Beaches,
W74-02712 2E

Application of the Implicit Method to Surges in Open Channels,
W74-02767 2E

Research in the Coastal and Oceanic Environment,
W74-03096 2J

Coastal Storms of the Eastern United States,
W74-03098 2B

Equilibrium Shapes of Coastline in Plan,
W74-03105 2J

Feasibility of Modeling Run-up Effects of Dispersive Water Waves,
W74-03106 8B

Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

Sediment Transport by Waves and Currents,
W74-03111 2J

Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2J

Wave Runup, Mono Lake Tests, 1965: A Summary of Theoretical Prediction Methods and Some Comparisons with Experimental Data,
W74-03113 2H

Calculation of a Solitary Wave Shoaling on a Shallow Slope,
W74-03115 8B

WEATHER MODIFICATION

Weather Modification Operations in California, October 1, 1968 - September 30, 1969,
W74-03056 3B

WEEDS

Differential Tolerance of Six Leguminous Crops to Terbutryne,
W74-02941 3F

Russian-Thistle (Salsola) Species in Western United States,
W74-02945 4A

WEIRS

Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

WELFARE (ECONOMICS)

Wells and Welfare. An Exploratory Cost-Benefit Study of the Economics of Small-Scale Irrigation in Maharashtra,
W74-03192 6B

Economic and Political Objectives in Fishery Management,
W74-03195 6B

WELL DATA

Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

WELL DESIGN

Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

WELL IMAGING

Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

WELL REGULATIONS

Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

WELL SEALING

Sealing Abandoned Water Wells.
W74-03169 8F

WELL SIMULATION

Feasibility Study: Hydraulic Fracturing of Drilled Water Wells to Stimulate Their Yield,
W74-02659 8B

WELL YIELD

Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

WELL YIELDS

Feasibility Study: Hydraulic Fracturing of Drilled Water Wells to Stimulate Their Yield,
W74-02659 8B

WELLBORE CURRENTS

A Double-Electrode Method of Spontaneous Potential Logging,
W74-03170 8G

WELLS

North Georgia Petroleum Company V. Lewis (Action by Property Owner Seeking Damages for Pollution of Water Supply and by Station Operator Against Gasoline Company for Loss of Profits).
W74-02818 6E

Designing for Future Expansion-Development of Ground Water in India,
W74-03151 4B

Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

Steady and Unsteady Flow Towards Gravity Wells,
W74-03161 4B

Computing the Barometric Efficiency of a Well,
W74-03167 8B

Wells and Welfare. An Exploratory Cost-Benefit Study of the Economics of Small-Scale Irrigation in Maharashtra,
W74-03192 6B

WEST PAKISTAN

Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

WEST VIRGINIA

U.S. V. Valley Camp Coal Company (Violation of Federal Statute Prohibiting Discharge of Refuse Matter into Navigable Waters).
W74-02810 6E

WETLANDS

Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

Stream Channelization (Part 5).
W74-02777 6G

Baylands Salt Water Flood Control Planning Study.
W74-02829 4A

WILDLIFE

Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

Preservation of Wilderness Areas--Hearing on S2453 and Related Wilderness Bills.
W74-02779 6E

Pothole Community Management for Livestock and Wildlife in the Intermountain Region,
W74-03083 4A

WILDLIFE MANAGEMENT

Effects of Migratory Waterfowl on Water Quality at the Montezuma National Wildlife Refuge, Seneca County, New York,
W74-02733 5B

WILLAMETTE RIVER

Lower Willamette River Management Plan.
W74-03121 4A

WIND EROSION

A Function for Sand Movement by Wind,
W74-02689 2J

WIND STRESS

A Numerical Model of Coastal Upwelling,
W74-02713 2E

WINDS

Surface Circulation of Lakes and Nearly Land-Locked Seas,
W74-02715 2H

WISCONSIN

Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

WISCONSIN

A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

WISCONSIN RIVER
Lower Wisconsin River Valley Soil Resources and Use Potentials,
W74-02957 4A

WYOMING
Ablation Characteristics of an Alpine Snow Field in Summer,
W74-02653 2C

Parametric Determination of Minimum Streamflow for Trout,
W74-02670 8I

Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

X-RAY DIFFRACTION
Determination of the Association and Dissociation of Humic Acid Fractions by Small Angle X-Ray Scattering,
W74-02730 2K

YEASTS
The Observation of Micro-Organisms on Surfaces by Incident Fluorescence Microscopy,
W74-02989 5A

ZEOLITES
Iron Removal Filter System,
W74-03002 5F

ZINC
Electrochemical Measurement of Zinc in Organic-Rich Water,
W74-02729 2H

ZONING
Lower Wisconsin River Valley Soil Resources and Use Potentials,
W74-02957 4A

ZOOPLANKTON
On Environmental Factors of Eel Ponds: Chemistry of Water and Soil and Plankton in March and June 1967, (In Japanese),
W74-02933 2H

AUTHOR INDEX

AARONSON, D. B.
Flow Characteristics of a Subsurface-Controlled Recharge Basin on Long Island, New York,
W74-02734 4B

ABIDAUD, A.
Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

ABOU-SEIDA, M. M.
Sediment Transport by Waves and Currents,
W74-03111 2J

ADAMS, H. III
Coastal Storms of the Eastern United States,
W74-03098 2B

ADLER, J. B.
Document Services and Referral Activities in the Legal, Legislative, and Regulatory Area,
W74-03051 10B

AHMAD, I.
Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

AIBA, S.
Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

AL-DIWANY, H. K.
Free Convection Film Condensation of Steam in the Presence of Non-Condensing Gases,
W74-02896 8B

ALEKSEYEV, YU. I.
All-Union Conference on Use and Conservation of Water Resources (Vsesoyuznoye soveshchaniye po ispol'zovaniyu i okhrane vodnykh resursov),
W74-02748 6B

ALLEE, D. J.
A Challenge to the Academic Community: Economics and Institutions in the Report of the National Water Commission,
W74-03184 6B

ALLEN, F. J. JR
Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

ALLEY, H. P.
Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

ALMGREN, T.
A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

ALT, L. M.
Filter Bottom and Molded Module Therefor,
W74-03006 5D

AMAR, A. C.
Hydrodynamics of Artificial Groundwater Recharge (Saturated Flow Theory),
W74-03091 4B

AMIEL, A. J.
Incorporation of Uranium in Modern Corals,
W74-03064 2K

AMIN, B. S.
Geochronological Studies in Santa Barbara Basin: Fe-55 as a Unique Tracer for Particulate Settling,
W74-02722 2J

ANAMBUTR, K.
Ground Water in Thailand,
W74-03150 4B

ANAND, A. S.
Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

ANDERSEN, J. C.
Water Resources Policy Issues Related to Agriculture,
W74-03182 6B

ANDERSON, D. O.
Implications of Selected National Water Commission Recommendations to Agricultural Policy,
W74-03181 6B

ANDERSON, D. W.
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

ANDERSON, O. S.
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

ANDERSON, R. G.
Sand Budget for Capitola Beach, California,
W74-02718 8B

ANDO, H.
Odonata of Sugadaira and Vicinity,
W74-02783 2I

ARMALY, B. F.
Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

ARMSTRONG, J. B.
Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

ARMSTRONG, R.
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

AULER, H.
Surface Aerator Having Wave Attenuator,
W74-03018 5D

AYOOB, S. M.
Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

BABANIN, V. F.
Magnetic Susceptibility of the Excess Temporary Moistening of Soils, (in Russian),
W74-02877 2G

BAER, A. D.
Turbulent Heat Transfer and the Periodic Viscous Sublayer,
W74-02884 8B

BAGLEY, J. M.
Water Resources Policy Issues Related to Agriculture,
W74-03182 6B

BAILEY, S. J.
Energy Signature Measures System Changes,
W74-02981 7B

BAKER, J. K.
Iron Removal Filter System,
W74-03002 5F

BAKER, M. F.
Small Mammals Increase on Recently Cleared and Seeded Juniper Rangeland,
W74-02938 4A

BANKS, H. O.
Water-Resources Planning,
W74-02843 6B

BARAM, M. S.
The Legal and Regulatory Framework for Thermal Discharge from Nuclear Power Plants,
W74-02875 5G

BARROW, H.
Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

BARSDATE, R. J.
Electrochemical Measurement of Zinc in Organic-Rich Water,
W74-02729 2H

The Influence of Dissolved Humic Substances on Trace Metal Phototoxicity,
W74-02727 2H

Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

Trace Metals in a Tundra Pond: Variations in Concentration and Their Effect on Phytoplankton Populations,
W74-02726 2H

BARTOS, L. R.
Ablation Characteristics of an Alpine Snow Field in Summer,
W74-02653 2C

BAYNE, B. L.
Biochemical Effects of Temperature and Nutritive Stress on Mytilus edulis L,
W74-02873 5C

BEATLEY, J. C.
Russian-Thistle (Salsola) Species in Western United States,
W74-02945 4A

BEBAWI, F. F.

BEBAWI, F. F.
Burning as a Supporting Management in the Control of Waterhyacinth in the Sudan. Part II. Backburning,
W74-02919 4A

Burning as a Supporting Treatment in Controlling Waterhyacinth in the Sudan. Part I. Routine Burning,
W74-02918 4A

BECKER, D. L.
The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

BEDROSIAN, A. J.
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

BELICHENKO, YU. P.
All-Union Conference on Use and Conservation of Water Resources (Vsesoyuznoye soveshchaniye po ispol'zovaniyu i okhrane vodnykh resursov),
W74-02748 6B

BELL, J. E.
Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

BELT, G. H.
Simulation Model for Evaluation of Interception Loss from Forest Trees, Part I. Modeling Snow Interception on Conifers and Part II. Laboratory Modeling of Snow Interception on Trees,
W74-02656 2I

BEN-DAVID, S.
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

BENGTSON, J.
Observations on Upstream Migration by Imagines of Some Plecoptera and Ephemeroptera,
W74-02967 5B

BERGER, B. B.
Water Quality Issues in the National Water Commission's Report 'Water Policies for the Future',
W74-03179 6B

BERRY, J. E.
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

BERTRAM, J. R.
Wave Runup, Mono Lake Tests, 1965: A Summary of Theoretical Prediction Methods and Some Comparisons with Experimental Data,
W74-03113 2H

BERUL, L. H.
Environmental Law Information System,
W74-03049 10B

BERZINS, BRUNO
A Microbenthos Study of Rotatoria,
W74-02893 2H

BESEMER, A. F. H.
Some Aspects of Chemical Control of Soil-Borne Pathogens,
W74-02889 5B

BEYCE, O.
Water Requirements of Various Crops in Arid and Semi-Arid Zones of Turkey,
W74-02937 3F

BIZZIGOTTI, P. J.
System for Surveillance of Ocean Dumping
W74-03021 5G

BLACK, T. A.
A Study of Evapotranspiration from a Douglas Fir Forest Using the Energy Balance Approach,
W74-02764 2D

BLAISE, C. R.
Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

BLEISTEIN, D. M.
Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

BOARD, R. G.
The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

BODINE, B. R.
Hurricane Surge Frequency Estimated for the Gulf Coast of Texas,
W74-02700 2L

BONHAM-CARTER, G.
Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

BORN, S.
A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

BORODINA, G. A.
Effect of Hydrolysis Plant Effluents on Fish (Vliyanne na ryb stochnykh vod gidroliznogo zavoda),
W74-03074 5C

BORST, R. L.
The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

BORTON, S. F.
Checklist of Puget Sound Fishes,
W74-03060 2L

BOUVENG, H. O.
Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

BOWEN, A. J.
Longshore Transport of Sand,
W74-02706 2J

BOWEN, D. H. M.
Primary Publications in Environmental Science,
W74-03044 10A

BOWIE, J. E.
Temperature of Missouri Streams,
W74-02885 2K

BRADLEY, C.
Ultrasonic Emissions in Snow,
W74-02741 2C

BRADY, E. L.
Information Centers Concerned with Environmental Matters: Physical Science and Technology,
W74-03042 10D

BRADY, P. J.
Forest Management on the Watershed,
W74-03129 4C

BREIDENSTEIN, F.
A Study of Water Circulation in Monterey Harbor Using Rhodamine B Dye,
W74-03114 2L

BRIGHAM, W. E.
Planning and Analysis of Pulse-Tests,
W74-03164 2F

BROCK, T. D.
Effects of Thermal Additions from the Yellowstone Geyser Basins on the Bacteriology of the Firehole River,
W74-02895 5B

BROOKE, L. T.
Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

BROWN, C. B.
Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

BROWN, J. P.
The Economic Effects of Floods. Investigations of a Stochastic Model of Rational Investment Behavior in the Face of Floods,
W74-03193 6A

BROWN, R. L.
On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

BRUTSAERT, W.
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

BRYAN, C. F.
Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

BUBNOV, V. A.
On Generalized Hydrodynamic Equations Used in Heat Transfer Theory,
W74-02880 8B

BUCHANAN, M. A.
Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

BUCLKEY, L. J.
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

BULLOCK, G. L.
Studies on Selected Myxobacteria Pathogenic for Fishes and on Bacterial Gill Disease in Hatchery-Reared Salmonids,
W74-02672 5C

BURBY, R. J. III
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

BURGESS, R. L.
Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

BURK, C. J.
Partial Recovery of a Vegetation in a Pollution Damaged Marsh,
W74-02663 5C

BURKHARDT, J. A.
Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

BUSAROV, V. N.
Investigation of Correlation of Annual Runoff for Appalachian Rivers (Issledovaniye korrelyativnoy svyazi godovogo stoka Appalachskikh rek),
W74-02752 2E

BUSH, D. C.
Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

BUTZ, I.
Observations on Upstream Migration by Imagines of Some Plecoptera and Ephemeroptera,
W74-02967 5B

CAIRNS, J. JR
Preliminary Report on Simulated Passage Effect of Potential Colonizing Protozoans Through Condenser of a Steam Electric Power Generating Plant Upon Downstream Protozoan Community Development,
W74-02930 5C

CALLENDER, E.
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

CALOI, P.
Free Oscillations in the Gulf of Civitavecchia and the Effect of Kinetic Viscosity (Le Oscillazioni Libere Del Golfo Di Civitavecchia E L'azione Della Viscosita Cinematica),
W74-02703 2L

CAMFIELD, F. E.
An Investigation of the Deformation and Breaking of Solitary Waves,
W74-02694 2E

CAMPBELL, C. J.
Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

CAMPBELL, M. D.
Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

Terradynamics,
W74-03165 8E

CAREAGA, R.
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

CARLIN, A. P.
Regional Research Opportunities under EPA Sponsorship,
W74-03176 6B

CARLSON, C. E. C.
The Denver System of Controls,
W74-02854 5F

CARTER, T. G.
Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

CESCON, B.
Dispersal Processes of Freshwaters in the Po River Coastal Area,
W74-02758 2E

CHANG, J. C.
Optimal Investment Orders Under Uncertainty and Dynamic Costs: Theory and Estimates,
W74-03199 6B

CHARLTON, J.
System for Surveillance of Ocean Dumping
W74-03021 5G

CHAUDHRY, Y. M.
Application of the Implicit Method to Surges in Open Channels,
W74-02767 2E

CHEN, K. L.
Nitrogen Fixation in Lake Sediments: A Contribution to Nitrogen Budget of Lake Mendota,
W74-02924 5C

CHERKAUER, D. S.
Minimization of Power Expenditure in a Riffle-Pool Alluvial Channel,
W74-02768 2J

CHEVALIER, J. R.
Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

CHISTYAKOV, M. P.
A Horizontal Distribution of Oribatids in Exhausted Peat-Bogs of the Balachninskaya Lowland, (In Russian),
W74-02820 2H

CICCARELLI, M. F.
Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

CLAPP, K. E.
Granular to Powdered Activated Carbon in Polluted Water Purification Process,
W74-03019 5D

CLARK, M.
The Ocean Edge of San Diego,
W74-03120 6D

CLARK, R. A.
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

CLARK, W. E.
Computing the Barometric Efficiency of a Well,
W74-03167 8B

COBB, B. F. III
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

COLBY, P. J.
Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

COLE, W. JR
Method for Treating Sewage,
W74-03012 5D

CONTRACTOR, D. N.
Application of the Implicit Method to Surges in Open Channels,
W74-02767 2E

COOK, C. C.
Process of Removing Water from Slimes,
W74-03007 5G

COOK, W. H.
The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

CORLISS, J. B.
Coastal Sand Dunes of Guerrero Negro, Baja California, Mexico,
W74-02704 2L

CORTES-RIVERA, G.
Flood Control Project Planning by Mathematical Programming: A Project-Expansion Approach,
W74-02674 4A

COTTON, J. B. JR
Temperature Trends and the Distribution of Groundfish in Continental Shelf Waters, Nova Scotia to Long Island,
W74-02867 5C

COTTRELL, W. B.
A Survey of the Biological-Science-Related Information Centers Listed in the Sequip Report,
W74-03041 10D

COUTANT, C. C.
Effect on Organisms of Entrainment in Cooling Water: Steps Toward Predictability,
W74-02894 5C

COX, D. C.
Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2J

CRAIG, D. C.
A Preliminary Investigation of the Recent Sediments Off the East Coast of Australia,
W74-02714 2J

CRAMPTON, L. M.
Thermolytic Sewage System,
W74-03001 5D

CREEL, B. J.
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

CROSBIE, A. L.
Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

CRUTCHFIELD, J. A.
Economic and Political Objectives in Fishery Management,
W74-03195 6B

CSANADY, G. T.
Surface Circulation of Lakes and Nearly Land-Locked Seas,
W74-02715 2H

CURDS, C. R.
A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

CURRY, G. L.
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

CURTIS, J. O.
Material Property and Boundary Condition Effects on Stresses in Avalanche Snowpacks,
W74-02743 2C

CUSTER, C. S.
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

DACRE, J. C.
Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

DANG, V-D.
High Reynolds Numbers Unsteady Convective Mass Transfer from Fluid Spheres,
W74-02891 2B

DANIEL, P. M.
Acton Lake: Biology of Its Benthos and Notes on Its Physical Limnology 1959-1970,
W74-03066 2H

DARBYSHIRE, M.
Sea Waves in Coastal Waters of the British Isles,
W74-02710 2L

DARBYSHORE, M.
The Surface Waters off the Coast of Kerala, South-West India,
W74-03103 2E

DAS, P.
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

DAVIES, R. H.
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

DAVIS, C. C.
Plankton Dynamics in a Newfoundland Lake,
W74-02926 5C

DAVIS, D.
Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

DAVIS, D. R.
A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

DAVIS, W. K.
Environmental Challenges and Nuclear Fuels,
W74-02892 5B

DAVONALD, D. H. III
Fluorescent Spectroscopy, A Technique for Characterizing Surface Films,
W74-02731 5A

DE GROOT, A. J.
Occurrence and Behaviour of Heavy Metals in River Deltas, with Special Reference to the Rhine and EMS Rivers,
W74-03034 5B

DELACY, A. C.
Checklist of Puget Sound Fishes,
W74-03060 2L

DELISLE, C. E.
Henneguya Sp. (Sporozoa:Myxosporida) As A Probable Cause of Death of Esox Niger in Brome Lake, Quebec,
W74-03025 2H

DELUCIA, R.
A Water Quality Simulation Model,
W74-02683 5B

DEMOYER, R. JR
A Statistical Approach to Dynamic Modeling and Control of Water Distribution Systems,
W74-02673 4A

DETERS, E. M.
Iron Removal Filter System,
W74-03002 5F

DICKMAN, M.
Total Dissolved Electrolyte Effects on Periphyton,
W74-02990 5C

DICKS, J. B.
MHD Central Power: A Status Report,
W74-02871 5B

DIERKSHEIDE, W. C.
Associated Organelles in the Blue-Green Alga, Anacystis Nidulans,
W74-02927 5C

DIRSCHL, H. J.
Geobotanical Processes in the Saskatchewan River Delta,
W74-02866 2I

DITTON, R. B.
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

DJORDJEVIC, B.
The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

DMITRIEVA, S. A.
Higher Water Vegetation and Its Fauna of Krotowaya Laga and Kusgan Lakes (North Kulanda), (In Russian),
W74-02901 2H

DOLAN, R.
Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

DONNELLY, T. G.
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

DORMAN, C. E.
The Southern Monterey Bay Littoral Cell: A Preliminary Sediment Budget Study,
W74-02695 2L

DOWNEY, J. S.
Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

DREW, L. J.
Random Drilling for Water in Carbonate Rocks,
W74-03141 8B

DUCKSTEIN, L.
A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

DUDLEY, W. W. JR
Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

DUNCAN, J. R. JR
The Effects of Water Table and Tide Cycle on Swash-Backwash Sediment Distribution and Beach Profile Development,
W74-02716 2J

DUNHAM, F.
A Study of Commercially Important Estuarine-Dependent Industrial Fishes,
W74-02839 6C

EASTY, D. B.
Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

EDINGER, J. E.
Characteristics of Steam Electric Condenser Cooling Waters,
W74-02869 5B

EDMONDS, D. C.
The 200 Miles Fishing Rights Controversy: Ecology or High Tariffs,
W74-03200 6E

EDWARDS, A.
An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

EISENMANN, R.
Apparatus for Separating Paint or the Like from Water,
W74-03008 5D

EISMA, D.
Sediment Distribution in the North Sea in Relation to Marine Pollution,
W74-03033 5B

ELDRIDGE, M. B.
Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

ELEKES, KAROLY
Electron Microscopic Investigation of Natural Bacterial Populations in the Water and Sediment of Lake Balaton and Lake Belso,
W74-02725 5A

ELLIOTT, O. M.
Sun Treats Cooling Water Without Chromates for Corrosion Protection,
W74-03160 8G

EMERY, K. O.
Sea Level as Affected by River Runoff, Eastern United States,
W74-02709 2E

Surface Circulation of Lakes and Nearly Land-Locked Seas,
W74-02715 2H

ESHEL, Y.
Differential Tolerance of Six Leguminous Crops to Terbutryne,
W74-02941 3F

ESTEY, R. H.
Soil Type, Moisture, Temperature and the Longevity of a Nematode Species of the Genus Tylenchorhynchus in the Absence of Plants,
W74-02719 2I

EVANS, M. K.
A Forecasting Model Applied to Pollution Control Costs,
W74-03189 5G

EVANS, R. J.
Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

EWING, G. C.
Coastal Sand Dunes of Guerrero Negro, Baja California, Mexico,
W74-02704 2L

FABOS, J. G.
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

FAIRCHILD, J. C.
Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2J

FARNER, F. A.
The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

FARQUHAR, O. C.
Diversion of Flood Flows from the Connecticut River and the Effect on Groundwater Supplies,
W74-02847 4B

FARRINGTON, P.
The Seasonal Growth of Lovegrass (Eragrostis Curvula) on Deep Sandy Soils In A Semi-Arid Environment,
W74-02942 3F

FAUST, S. D.
Atmospheric Reaeration Capacity of Streams. Part I. Critical Review of Methods Available to Measure and to Calculate the Atmospheric Reaeration Rate Constant,
W74-02916 5C

Atmospheric Reaeration Capacity of Streams. Part II. Direct Measurement of the Atmospheric Reaeration Rate Constant in the Upper Raritan River Basin,
W74-02917 5C

FAZZOLARE, R. A.
Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

FEDERER, C. A.
Forest Transpiration Greatly Speeds Streamflow Recession,
W74-02766 2D

FELTES, R. M.
Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

FIERING, M.
A Water Quality Simulation Model,
W74-02683 5B

FISHBACH, P. E.
Reuse Irrigation Cuts Costs,
W74-03194 5D

FISHER, B. D.
Water Pollution--The Tennessee Response; Conclusions and Generalizations,
W74-02794 6E

FISHER, R. V.
Antidune and Chute and Pool Structures in the Base Surge Deposits of the Laacher See Area, Germany,
W74-03063 2J

FLACK, J. E.
Policy Issues Related to Urbanization,
W74-03178 6B

FLATLAND, L. P.
Skimmer for a Water Body,
W74-03017 5G

FLETCHER, M. R.
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

FOGEL, M.
Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

FOGEL, M. M.
A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

FOOTE, R. Q.
Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

FORBES, G.
Easier, More Exact Method Speeds Annulus Pressure-Loss Calculations,
W74-03162 8G

FORSTER, M.
Civil Liability of Shipowners for Oil Pollution,
W74-02796 6E

FORTHUN, M. L.
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

FREYRE, L.
Pollution of the 'El Carpincho' Pond (Pampasic Region, Argentina) and Its Effects on Plankton and Fish Communities,
W74-02923 5C

FRIEDMAN, G. M.
Incorporation of Uranium in Modern Corals,
W74-03064 2K

FRISCHKNECHT, N. C.
Small Mammals Increase on Recently Cleared and Seeded Juniper Rangeland,
W74-02938 4A

FUJITA, D. K.
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

FUNKE, J. W.
The Full-Scale Refinement of Purified Sewage for Unrestricted Industrial use in the Manufacture of Fully Bleached Kraft-Pulp and Fine Paper,
W74-02906 5D

GABBOTT, P. A.
Biochemical Effects of Temperature and Nutritive Stress on Mytilus edulis L,
W74-02873 5C

GAGOSHIDZE, M. S.
Mudflow Properties and Patterns (O svoystvakh i zakonomernostyakh selevykh potokov),
W74-02750 2J

GAITHER, W. S.
Research in the Coastal and Oceanic Environment,
W74-03096 2J

GALLER, W. S.
Design Optimization for Biological Filter Models,
W74-02679 5D

GALLOWAY, T. R.
Heat Transfer Fouling Through Growth of Calcareous Film Deposits,
W74-02882 8G

GALVIN, C. J. JR
Breaker Type Classification on Three Laboratory Beaches,
W74-02712 2E

GAUCH, G. J.
Apparatus,
W74-03014 5G

GAYMAN, W. R.
Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2J

GEBHARDT, T. G. JR
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

GERALDINE, M. H.
Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

GERLACH, E. H.
Microdilution Antibiotic Susceptibility Test: Examination of Certain Variables,
W74-02968 5A

GESINK, R. W.
Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

GIGINEYSHVILI, G. N.
Karst Waters of the Caucasus (Karstovyye vody Bol'shogo Kavkaza),
W74-02756 2E

GILBERT, D. E.
Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

GISSER, M.
Economic Policy for Water Resources and Placement Flows,
W74-03191 4B

GLANTZ, P. J.
Escherichia coli Serogroups Isolated from Streams in Pennsylvania, 1965 to 1972,
W74-02988 5A

GLAZE, W. H.
Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

GLOVER, R. E.
Groundwater Movement,
W74-03142 4B

GOLDBERG, M. C.
Fluorescent Spectroscopy, A Technique for Characterizing Surface Films,
W74-02731 5A

GOLDMAN, C. R.
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

GOTAAS, H. B.
Design Optimization for Biological Filter Models,
W74-02679 5D

GRADER, R. J.
The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

GRANCINI, G.
Dispersal Processes of Freshwaters in the Po River Coastal Area,
W74-02758 2E

GRAVES, W. L. JR
Characteristics of Steam Electric Condenser Cooling Waters,
W74-02869 5B

GREENE, C.
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

GREENWELL, L. G.
Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

GREIF, R.
Evaporation Retardation by Monolayers,
W74-02774 3B

GREINER, E. C.
Weather Modification Operations in California, October 1, 1968 - September 30, 1969,
W74-03056 3B

GRELEN, H. E.
Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

GRIFFITHS, R. P.
Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

Reversible Heat Injury in the Marine Psychrophilic Bacterium Vibrio marinus MP-1,
W74-02883 5C

GRIGORKINA, T. YE
Hydrography and Water Resources of Australia (Gidrografiya i vodnyye resursy Avstralii),
W74-02757 6B

GROSSMAN, G. S.
Legal Bibliography: A Critical Overview,
W74-03050 10C

GUNNELL, F.
Pothole Community Management for Livestock and Wildlife in the Intermountain Region,
W74-03083 4A

GUPTA, T. R.
Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

GVERIN-DUMARTRAIT, E.
Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophylliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

HAGAN, R. M.
Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

HAIGHT, R. D.
Reversible Heat Injury in the Marine Psychrophilic Bacterium Vibrio marinus MP-1,
W74-02883 5C

HAIMES, Y. Y.
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

HAITH, D. A.
Optimal Control of Nitrogen Losses from Land Disposal Areas,
W74-02677 5B

HAJDU, LAJOS
Electron Microscopic Investigation of Natural Bacterial Populations in the Water and Sediment of Lake Balaton and Lake Belso,
W74-02725 5A

HALL, W. A.
Opportunities for Regional Coordination and Cooperation in Water Resources Research,
W74-03175 6B

HALLER, W. T.
Effect of pH and High Phosphorus Concentrations on Growth of Waterhyacinth,
W74-02934 5C

HALLS, N. A.
The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

HAMANN, J. J.
Iron Removal Filter System,
W74-03002 5F

HAMBRICK, P. S.
Rotenone Methods in a Large River System,
W74-02736 8I

HAMILTON, L. C.
Introduction to Legal, Legislative and Regulatory Session of National Environmental Protection Symposium,
W74-03048 10B

HANUS, F. J.
Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

HARBAUGH, J. W.
Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

HARDING, G. C. H.
Decomposition of Marine Copepods,
W74-02973 5A

HARDY, J. T.
Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

HARLAN, S.
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

HARRIS, R. W.
Crater-Sink Sand Transfer System,
W74-02705 8A

HARRISS, R. C.
Mechanisms Controlling Pore Water Salinities in a Salt Marsh,
W74-02761 2K

HARSANYI, E.
Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

HASHIMOTO, K.
On the Water Quality of Lake Biwa, The Seta River and some Rivers in Otsu City and the Heavy Metal Content of Bottom Matters of Lake Biwa, (In Japanese),
W74-02935 5B

HAVE, M. R.
Effects of Migratory Waterfowl on Water Quality at the Montezuma National Wildlife Refuge, Seneca County, New York,
W74-02733 5B

HAYNSWORTH, E. M.
Process of Removing Water from Slimes,
W74-03007 5G

HEALY, N. J.
Federal Legislation Regarding Marine Pollution,
W74-02795 6E

HELLWIG, D. H. R.
Survey of Rain Run-Off Harvesting,
W74-02915 3B

HELM, J. C.
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

HENDERSON, J. E. IV
Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

HENRY, J. L.
The Adsorption of Rhodamine-B on to Materials Carried in Suspension by Inshore Waters,
W74-02721 5B

HIBBERT, A. R.
Unsaturated Flow Properties Used to Predict Outflow and Evapotranspiration from a Sloping Lysimeter,
W74-02771 2D

HILL, H. W.
Currents and Water Masses,
W74-03029 2E

HILL, I. K.
A Water Quality Simulation Model,
W74-02683 5B

HILLYARD, S. D.
Respiration and Thermal Tolerance of Phyllopod Crustacea Triops longicaudatus and Thamnocephalus platyurus Inhabiting Desert Ephermeral Ponds,
W74-03090 2H

HILSEN, N. B.
Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

HIPKIN, C. R.
The Appearance of Nitrate Reductase Activity in Nitrogen-Starved Cells of Ankistrodesmus Braunii,
W74-02929 5C

HOARAU, J.
Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophylliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

HOBBIE, J. E.
Output of Phosphorus, Dissolved Organic Carbon, and Fine Particulate Carbon from Hubbard Brook Watersheds,
W74-02759 2K

HOCUTT, C. H.
Rotenone Methods in a Large River System,
W74-02736 8I

HODGSON, W. F.
Method for the Selective Enumeration of Blue-Green Bacteria in Water,
W74-02974 5A

HOKANSON, K. E. F.
Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

HOLDEN, W. R.
Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

HOLE, F. D.
Lower Wisconsin River Valley Soil Resources and Use Potentials,
W74-02957 4A

HOLT, C. C.
Optimal Investment Orders Under Uncertainty and Dynamic Costs: Theory and Estimates,
W74-03199 6B

HOOVER, L. R.
Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

HOPKINS, H. P. JR
Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

HORI, T.
On the Water Quality of Lake Biwa, The Seta River and some Rivers in Otsu City and the Heavy Metal Content of Bottom Matters of Lake Biwa, (In Japanese),
W74-02935 5B

HOUDE, E. D.
Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

HOWARD, G. C.
Protecting Offshore Structures from Ice,
W74-03013 8C

HOWELLS, D. H.
Highlights and Issues of the 1972 Amendments to the Federal Water Pollution Control Act,
W74-03180 6B

HOWTON, H. M.
Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

HUBBY, L. M.
Method and Apparatus for Determining a Fluid Contaminant,
W74-03000 5G

HUBER, M. J.
A Flow Path Ground Water Sampler,
W74-03126 7B

HULL, A. R.
Federal Environmental Data Centers and Systems,
W74-03043 10D

HUNT, W. A.
Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

HUNTER, L. A. W.
The Proposed International Compensation Fund for Oil Pollution Damage,
W74-02799 6E

HURGHISIU, I.
Hydrochemical Investigations Regarding the River Olt, in the Section of Turnu Rosu Pass, (In Rumanian),
W74-02903 2K

HURLBURT, H. E.
A Numerical Model of Coastal Upwelling,
W74-02713 2E

HUTCHINSON, R. D.
Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

HUTKA, J.
Fragmentation of Granitic Quartz in Water,
W74-03065 2J

HYDE, J. A.
Oil Removal from Waste Waters,
W74-03020 5D

IBRAGIMOV, M. H.
Calculation of Heat Transfer in Turbulent Flow with Allowance for Secondary Flow,
W74-02904 8B

IKAWA, M.
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

INGRAM, H. M.
A Challenge to the Academic Community: Economics and Institutions in the Report of the National Water Commission,
W74-03184 6B

INMAN, D. L.
Coastal Sand Dunes of Guerrero Negro, Baja California, Mexico,
W74-02704 2L

Crater-Sink Sand Transfer System,
W74-02705 8A

Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2J

Longshore Transport of Sand,
W74-02706 2J

A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

IPPEN, A. T.
Wave Induced Oscillations in Harbors,
W74-02708 2L

ISBELL, A. F. JR
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

ITAKURA, T.
Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

ITASAKA, O.
On the Water Quality of Lake Biwa, The Seta River and some Rivers in Otsu City and the Heavy Metal Content of Bottom Matters of Lake Biwa, (In Japanese),
W74-02935 5B

ITO, T.
On Environmental Factors of Eel Ponds: Chemistry of Water and Soil and Plankton in March and June 1967, (In Japanese),
W74-02933 2H

JACKSON, P. B. N.
Preliminary Report on Small Fishes From the Hendrik Verwoed Dam, Orange River,
W74-02914 2H

JACOB, C. E.
Drawdown Distribution Due to Well Fields in Coupled in Coupled Leaky Aquifers, 1. Infinite Aquifer System,
W74-02773 2F

JACOBSON, P. M.
Observations on the Reactions of Young American Shad to a Heated Effluent,
W74-02900 5C

JARR, K. D.
Iron Removal Filter System,
W74-03002 5F

JASINSKI, R.
Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

JAVORNICKY, P.
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

JAWED, K.
Comparison of Methods of Deriving Unit Hydrographs,
W74-02828 2E

JEFFRIES, H. P.
Partitioning of the Estuarine Environment by Two Species of Cancer,
W74-02717 2L

JENKINS, A. S.
Document Services and Referral Activities in Industry and the Federal Government,
W74-03052 10B

JENKINS, R. E.
Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

JENSEN, A.
Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

JENSEN, A. L.
Statistical Analysis of Biological Data from Preoperational-Postoperational Industrial Water Quality Monitoring,
W74-02993 5A

Variation in Results of Identical Bioassays of Minnows Subjected to Instant Temperature Increase,
W74-02898 5C

JENSEN, N. S.
The Idaho System for the Distribution of Water Among Its Appropriators: An Examination and Assessment,
W74-02793 6E

JOHNSON, W. C.
Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

JOHNSON, W. S.
Respiration Rates of Some New Zealand Echinoderms (Note),
W74-02949 5A

JOHNSTON, A. K.
Observations on Floating Breakwaters for Reflection of Shallow Water Waves (Recherches Sur Les Brise-Lames Flottants Destines A Reflechir La Houle En Eau Peu Profonde),
W74-02693 2J

JONES, B. R.
Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

JONES, D.
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

JONES, J. J.
Forest Management on the Watershed,
W74-03129 4C

JONES, L. G.
Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

JONES, S. M.
The Observation of Micro-Organisms on Surfaces by Incident Fluorescence Microscopy,
W74-02989 5A

JORDAAN, J. M. JR
Feasibility of Modeling Run-up Effects of Dispersive Water Waves,
W74-03106 8B

JOSEFSSON, B.
A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

KADIB, A. A.
A Function for Sand Movement by Wind,
W74-02689 2J

KANERVA, R. A.
An Overview of Maryland's Sediment Control Program,
W74-02852 5G

KANN, E.
On the Systematics and Ecology of the Genus Chamesiphon (Cyanophyceae). 2. Ecology (Zur Systematik und Okologie det Gattung Chamesiphon (Cyanophyceae) 2. Okologie),
W74-02952 5C

KARPLUS, W. J.
New Simulation Approaches to the Modeling of Environmental Systems,
W74-02684 6A

KASAHARA, S.
An Ecological Study on the So-Called Mogai (Anadara subcrenata (Lischke)) Cultured in the Kasaoka Bay (In Japanese),
W74-02690 5C

KATZER, J. R.
Catalytic Oxidation of Organics in Wastewater,
W74-02655 5D

KAZMIERSKI, J. A.
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

KEAMMERER, W. R.
Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

KEENEY, D. R.
Nitrogen Fixation in Lake Sediments: A Contribution to Nitrogen Budget of Lake Mendota,
W74-02924 5C

KEIFER, C. J.
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

KELLER, H. B.
Water Wave Run-Up on a Beach,
W74-02698 2E

KELLER, J. B.
Water Wave Run-Up on a Beach,
W74-02698 2E

KELLER, M.
Tidal Current Surveys by Photogrammetric Methods,
W74-02707 2L

KELUS, J.
Determination of Furfural in Water and Asphalt (In Polish),
W74-02798 5A

KENNEY, K. B.
Public Policy Alternatives Affecting Water and Sewer Service in Urban Growth Areas.,
W74-02835 3D

KESSLER, E.
Effect of Nitrite and Nitrate on Chlorophyll Fluorescence in Green Algae,
W74-02928 5C

KHANDEKAR, A. K.
Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

KILCULLEN, B. M.
The Measurement of the Heat of Reaction Between Proteins and Clay Minerals by Microcalorimetry,
W74-02669 2G

KING, K. A. J.
Determination of the Heat Capacity of Lake Kariba,
W74-02910 2H

KING, W. M.
Dynamics Reverse Osmosis Membranes of Ultrathin Discs,
W74-03009 3A

KISIEL, C.
Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

KISIEL, C. C.
A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

KLEMAS, V.
Research in the Coastal and Oceanic Environment,
W74-03096 2J

KLYACHKO, YU. A.
Determination of Polyacrylamide in the Drinking Water by Means of an Adsorption Photometric Method, (In Russian),
W74-02932 5A

KNEESE, A. V.
Comments on the Report of the National Water Commission,
W74-03174 6B

KNETSCH, J. L.
Value Comparisons in Free-Flowing Stream Development,
W74-03190 6B

KNOX, W. T.
Document Services,
W74-03046 10C

KNOY, M. G.
Filter Bottom and Molded Module Therefor,
W74-03006 5D

KOCHETKOV, A. I.
Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

KODYAYEV, G. V.
A Morphometric Description of Lake Issyk-Kul' (Morformetricheskaya kharakteristika ozera Issyk-Kul'),
W74-02755 2H

KOERPERICH, E. A.
A Double-Electrode Method of Spontaneous Potential Logging,
W74-03170 8G

KOLKA, J. W.
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

KOMAR, P. D.
Longshore Transport of Sand,
W74-02706 2J

KOMPASS, E. J.
Low-Cost Digital Data Acquisition Systems,
W74-02980 7C

KOONTZ, W. A.
A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

KOROSTELEVA, G. D.
Loss of Nitrogen from Various Nitrogen Fertilizers on Irrigated Land,
W74-02936 3F

KRAFT, J.
A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

KRATCHMAN, J.
The Rise and Fall of Natural Resource Systems,
W74-02786 6E

KREISSL, J. F.
Waste Treatment for Small Flows,
W74-02723 5D

KRIEBEL, A. R.
Calculation of a Solitary Wave Shoaling on a Shallow Slope,
W74-03115 8B

Wave Runup, Mono Lake Tests, 1965: A Summary of Theoretical Prediction Methods and Some Comparisons with Experimental Data,
W74-03113 2H

KRIGMAN, A.
Guide to Selecting Digital Multiplexers,
W74-02983 7C

KRISHNASWAMI, S.
Geochronological Studies in Santa Barbara Basin: Fe-55 as a Unique Tracer for Particulate Settling,
W74-02722 2J

KRISTIANSEN, O. E.
The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

KRUGER, P.
Stimulation Modes of Geothermal Aquifers,
W74-02876 4B

KUCHIN, G. P.
Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

KUNKEL, R.
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

KURTZ, J.
A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

KUSLER, J.
A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

LACKEY, R. T.
Bottom Fauna Changes During Artificial Reservoir Destratification,
W74-02992 5C

LAL, D.
Geochronological Studies in Santa Barbara Basin: Fe-55 as a Unique Tracer for Particulate Settling,
W74-02722 2J

Wells and Welfare. An Exploratory Cost-Benefit Study of the Economics of Small-Scale Irrigation in Maharashtra,
W74-03192 6B

LANDERS, R. Q.
Plant Species as Wildlife Cover and Erosion Control on 'Mudflats' in Iowa's Lareg Reservoir Systems,
W74-02666 4D

LANG, T. E.
On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

LANSFORD, R. R.
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

LAUGHLIN, W. C. JR
Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

LAURENCE, G. C.
Influence of Temperature on Energy Utilization of Embryonic and Prolarval Tautog, Tautoga onitis,
W74-02872 5C

LEAY, R. W.
Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

LECLERC, J. C.
Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophylliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

LEE, E. S.
Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume I, Time Series Analysis in Water Quality Modeling,
W74-02823 5B

Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume II, Nonlinear Filtration and Estimation in Water Quality Modeling,
W74-02824 5B

LEE, G. A.
Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

LEE, K. S.
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

LEENHEER, J. A.
Fractionation and Characterization of Natural Organic Matter from Certain Rivers and Soils by Free-Flow Electrophoresis,
W74-03062 2K

LEESE, M. N.
Use of Censored Data in the Estimation of Gumbel Distribution Parameters for Annual Maximum Flood Series,
W74-02763 2E

LEMONS, V. H.
Snow Survey Measurements Through 1970,
W74-02738 2C

LEWIS, P. A.
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

LEYENDEKKERS, J. V.
The Ionic Activity Function of Water and the Activity Coefficient of the Hydrogen Ion in Seawater,
W74-02760 1B

LIEBERMAN, L.
Microdilution Antibiotic Susceptibility Test: Examination of Certain Variables,
W74-02968 5A

LIFSHIN, E.
Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

LIKENS, G. E.
Output of Phosphorus, Dissolved Organic Carbon, and Fine Particulate Carbon from Hubbard Brook Watersheds,
W74-02759 2K

LIN, W.
Hydrodynamics of Laminar Flow Over a Porous Bed,
W74-02770 2E

LINDBERG, S. E.
Mechanisms Controlling Pore Water Salinities in a Salt Marsh,
W74-02761 2K

LINDBERGH, J. M.
Pacific Salmon Aquaculture Program--Incubation and Cultivation Phases,
W74-03028 2L

LINSLEY, R. K. JR
Implications of the National Water Commission Report for the Universities Council on Water Resources,
W74-03173 6B

LIOTTA, C. L.
Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

LIPOVKOV, I. Z.
Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

LIST, E. J.
Disposal of Brine into An Estuary,
W74-02735 5B

LIU, P. L-F,
Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

LOBKO, V. V.
Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

LOBUE, J. F.
Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

LOOK, D. C.
Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

LORENC, W. F.
Oil Removal from Waste Waters,
W74-03020 5D

LORTON, E. D.
Preliminary Report on Simulated Passage Effect of Potential Colonizing Protozoans Through Condenser of a Steam Electric Power Generating Plant Upon Downstream Protozoan Community Development,
W74-02930 5C

LOUGHNAN, F. C.
A Preliminary Investigation of the Recent Sediments Off the East Coast of Australia,
W74-02714 2J

LUSBY, W. S.
Power Plant Effluent - Thermal Pollution or Energy at a Bargain Price,
W74-02888 5B

LUTERNAUER, J. L.
Sedimentation on the Western Delta-Front of the Fraser River, British Columbia,
W74-03061 2L

MACGREGOR, A. N.
Nitrogen Fixation in Lake Sediments: A Contribution to Nitrogen Budget of Lake Mendota,
W74-02924 5C

MACHEN, C.
Natural Habitat of Caryophanon latum,
W74-02966 5B

MACKIEWICZ, J. S.
Two New Species of Caryophyllid Tapeworms from Catostomid Fishes in Tennessee,
W74-02995 2I

MACLEAN, G. J.
Oil Spillage Enclosure System for Marine Use,
W74-03015 5G

MADSEN, B. L.
Observations on Upstream Migration by Imagines of Some Plecoptera and Ephemeroptera,
W74-02967 5B

MAHDAVIANI, M. A.
Steady and Unsteady Flow Towards Gravity Wells,
W74-03161 4B

MALCOLM, R. L.
Fractionation and Characterization of Natural Organic Matter from Certain Rivers and Soils by Free-Flow Electrophoresis,
W74-03062 2K

MANAHAN, S. E.
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

MARCY, B. C. JR
Observations on the Reactions of Young American Shad to a Heated Effluent,
W74-02900 5C

MARKOWSKI, S.
The Cooling Water of Power Stations: A New Factor in the Environment of Marine and Fresh-Water Invertebrates,
W74-02879 5C

Observations on the Response of Some Benthonic Organisms to Power Station Cooling Water,
W74-02881 5C

MASNIK, M. T.
Rotenone Methods in a Large River System,
W74-02736 8I

MATHER, J. R.
Coastal Storms of the Eastern United States,
W74-03098 2B

MATHERLY, J. E.
An Economic Feasibility Study of Fayetteville, North Carolina, Treating Fort Bragg's Wastewater,
W74-03187 5D

MAUGHAN, O. E.
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

MCBEAN, E.
Development of a Marginal Analysis Capability for Water Resources Simulation Models,
W74-02682 4A

A Water Quality Simulation Model,
W74-02683 5B

MCBRIDE, R. N.
Individual Home Aerobic Wastewater Treatment Systems,
W74-02668 5D

MCCAVE, I. N.
Mud in the North Sea,
W74-03031 2J

MCCLUNG, D.
Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

MCCLYMONDS, N. E.
Water Resources of the Ponce Area, Puerto Rico,
W74-03038 4A

MCCORMICK, J. H.
Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

MCCURDY, H. D. JR
Method for the Selective Enumeration of Blue-Green Bacteria in Water,
W74-02974 5A

MCFARLAND, M. W.
Referral Activities and Other Non-Bibliographic Information Services,
W74-03047 10B

MCGEE, O. S.
The Content of Water Vapour in the Atmosphere Over Southern Africa,
W74-02913 2B

MCGINNIS, L. D.
Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

MCLAMORE, R. T.
The Role of Rock Strength Anisotropy in Natural Hole Deviation,
W74-03156 8B

MCNAUGHTON, K. G.
A Study of Evapotranspiration from a Douglas Fir Forest Using the Energy Balance Approach,
W74-02764 2D

MCROY, C. P.
Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

MEADE, R. H.
Sea Level as Affected by River Runoff, Eastern United States,
W74-02709 2E

MEEK, B. D.
A Flow Path Ground Water Sampler,
W74-03126 7B

MEEK, R. L.
Turbulent Heat Transfer and the Periodic Viscous Sublayer,
W74-02884 8B

MEFFERT, M. E.
The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

MEI, C. C.
Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

MELLOR, M.
Controlled Release of Avalanches by Explosives,
W74-02746 2C

MELVILLE, L.
Biological Surveys: Intent, Methodology, Interpretation,
W74-03086 5C

MERRIAM, R. A.
Fog Drip from Artificial Leaves in a Fog Wind Tunnel,
W74-02765 2I

MERRIMAN, D.
Calefaction of the Connecticut River, U.S.A.,
W74-02864 5B

MICK, G. E.
Boulder Creek Flood Control Project--An Environmental Status Report,
W74-02859 6F

MIELENZ, R. C.
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

MIKHAILOVA, N. V.
Determination of Polyacrylamide in the Drinking Water by Means of an Adsorption Photometric Method, (In Russian),
W74-02932 5A

MIKHAYLOV, V. M.
Role of Depth of Channel Downcutting in the Formation of Low Flow in Mountain Streams (Rol' glubiny vreza rusel v formirovanii mazhennogo stoka gornykh rek),
W74-02753 2E

MILLER, B. S.
Checklist of Puget Sound Fishes,
W74-03060 2L

MILLER, D. S.
Incorporation of Uranium in Modern Corals,
W74-03064 2K

MILLS, L. R.
Federally Reserved Rights to Underground Water-A Rising Question in the Arid West,
W74-02792 6E

MINNEHAN, R. F.
A Study of the Optimal Mix of Private and Public Action for Local and Regional Water Conservation,
W74-02654 6B

MITZNER, L.
Population Studies of Bigmouth Buffalo in Coralville Reservoir with Special Reference to Commercial Harvest,
W74-03036 8I

MIYAKAWA, K.
Odonata of Sugadaira and Vicinity,
W74-02783 2I

MOHAMED, B. F.
Burning as a Supporting Management in the Control of Waterhyacinth in the Sudan. Part II. Backburning,
W74-02919 4A

Burning as a Supporting Treatment in Controlling Waterhyacinth in the Sudan. Part I. Routine Burning,
W74-02918 4A

MOKIYEVSKIY, O. B.
Littoral Fauna Along the NW Coast of the Sea of Japan,
W74-02691 2L

MOLNAU, M.
Simulation Model for Evaluation of Interception Loss from Forest Trees, Part I. Modeling Snow Interception on Conifers and Part II. Laboratory Modeling of Snow Interception on Trees,
W74-02656 2I

MORITA, R. Y.
Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

MORRISON, J. L.
Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

MORTOJUDO, J. W.
The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

MOSS, A. J.
Fragmentation of Granitic Quartz in Water,
W74-03065 2J

MOSS, M. E.
Cross Correlation of the Logarithms of Estimates of Mean Streamflows,
W74-02775 2E

MUELLER, J. C.
Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

MULFORD, R. A.
An Annual Plankton Cycle on the Chesapeake Bay in the Vicinity of Calvert Cliffs, Maryland, June 1969 - May, 1970,
W74-02863 5C

MULLER, A.
San Diego's Offshore Area,
W74-02831 6F

MURRAY, J. W.
Sedimentation on the Western Delta-Front of the Fraser River, British Columbia,
W74-03061 2L

MUSOLF, G. E.
Lower Wisconsin River Valley Soil Resources and Use Potentials,
W74-02957 4A

NACE, R. L.
Problems of Underground Storage of Wastes,
W74-02732 5B

NAGATA, Y.
Deformation of Temporal Pattern of Orbital Wave Velocity and Sediment Transport in Shoaling Water, In Breaker Zone and on Foreshore,
W74-02711 2L

NAKAJIMA, R.
MGCO3 Addition to CASO4 Containing Sea Water to Prevent Corrosion,
W74-03010 3A

NAKAMURA, N.
An Ecological Study on the So-Called Mogai (Anadara subcrenata (Lischke)) Cultured in the Kasaoka Bay (In Japanese),
W74-02690 5C

NANKEE, R. L.
Observations on the Reactions of Young American Shad to a Heated Effluent,
W74-02900 5C

NANNI, U. W.
Water-Use by Riparian Vegetation at Cathedral Peak,
W74-02912 3B

NARUMI, K.
Odonata of Sugadaira and Vicinity,
W74-02783 2I

NEALE, L. C.
Chesapeake Bay Model Study for Calvert Cliffs,
W74-02905 5B

NEBERT, M.
Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

NEIHEISEL, J.
Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

NEIL, F. C.
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

NELSON, D.
An Economic Feasibility Study of Fayetteville, North Carolina, Treating Fort Bragg's Wastewater,
W74-03187 5D

NELSON, H. F.
Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

NEUMANN, J.
Computation of the Sensible Heat Flux and Its Relation to Other Components of the Heat Balance at the Surface,
W74-02940 2D

NG, K. S.
Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

NICOL, S. M.
Efficient Flood Control of Dams Equipped with Crest Gates,
W74-02911 8C

NIEWOLAK, S.
The Occurrence of Heterotrophic Bacteria in the Waters of the Ilawa Lakes and Some of Their Physiological and Biochemical Properties,
W74-02931 5C

NILSEN, H.
Effluent Treatment Plants in the Forest Products Industry (Puunjalostusteollisuuden jatevesipuhdistamot),
W74-03087 5D

NORTON, J. L.
The Identification and Measurement of Chlorinated Hydrocarbon Pesticides Accumulated From Urban Runoff,
W74-02665 5A

NORUM, D. I.
Hydrodynamics of Laminar Flow Over a Porous Bed,
W74-02770 2E

O'BRIEN, J. J.
A Numerical Model of Coastal Upwelling,
W74-02713 2E

OGIGA, I. R.
Soil Type, Moisture, Temperature and the Longevity of a Nematode Species of the Genus Tylenchorhynchus in the Absence of Plants,
W74-02719 2I

OHYAMA, Y.
On the Water Quality of Lake Biwa, The Seta River and some Rivers in Otsu City and the Heavy Metal Content of Bottom Matters of Lake Biwa, (In Japanese),
W74-02935 5B

OKESON, L.
The Ocean Edge of San Diego,
W74-03120 6D

OKUMURA, Y.
On the Water Quality of Lake Biwa, The Seta River and some Rivers in Otsu City and the Heavy Metal Content of Bottom Matters of Lake Biwa, (In Japanese),
W74-02935 5B

OKUN, D. A.
Planning for Water Resue,
W74-02845 5D

OLAH, JANOS
Electron Microscopic Investigation of Natural Bacterial Populations in the Water and Sediment of Lake Balaton and Lake Belso,
W74-02725 5A

OLSEN, L. J.
Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

OLSON, G. T. II
Preservation of Reservoir Sites,
W74-03123 6F

OTVOS, E. G.
Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

OVERPECK, A. D.
Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

OZBURN, G.
A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

PAGLIARI, M.
First Experimental Results on the Diffusion of Fresh Water in a shallow bay,
W74-03100 2L

PARIZEK, R. R.
Random Drilling for Water in Carbonate Rocks,
W74-03141 8B

PARKHURST, J. D.
Regional Planning for Sewerage Systems,
W74-02860 6A

PARMENTIER, A. H.
Slurry Concentrator and Filter Apparatus,
W74-03003 5D

PARSONS, T. R.
Environmental Control of Phytoplankton Cell Size,
W74-02998 5C

PATON, A. M.
The Observation of Micro-Organisms on Surfaces by Incident Fluorescence Microscopy,
W74-02989 5A

PATTEN, B. G.
Predation, Particularly by Sculpins, on Salmon Fry in Fresh Waters of Washington,
W74-03058 2I

PECSOK, R. L.
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

PEJKA, H.
Investigation on the Ecology and Control of Wild Oat (Avena fatua L.) Under the Conditions in Wroclaw Voivodeship, (In Polish),
W74-02921 3F

PERDUE, E. M.
Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

PEREDNYA, E. A.
Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

PEREIRA, H. C.
Land Use and Water Resources,
W74-03024 2A

PETERFI, L. S.
Contribution to Knowledge about the Algae (Excluding Bacillariophyceae) of Stagnant Waters of the Iron Gates of the Danube,
W74-02699 5C

PETRASCU, S.
Hydrochemical Investigations Regarding the River Olt, in the Section of Turnu Rosu Pass, (In Rumanian),
W74-02903 2K

PETRISHCHEV, V. S.
Calculation of Heat Transfer in Turbulent Flow with Allowance for Secondary Flow,
W74-02904 8B

PFISTER, R. M.
Associated Organelles in the Blue-Green Alga, Anacystis Nidulans,
W74-02927 5C

Growth of an Adherent Mixed Microbial Culture in a Substrate Limited Single State Chemostat,
W74-02661 5C

PINCINCE, A. B.
Disposal of Brine into An Estuary,
W74-02735 5B

PINCKNEY, D. J.
Determination of the Association and Dissociation of Humic Acid Fractions by Small Angle X-Ray Scattering,
W74-02730 2K

PINDER, G. F.
A Galerkin-Finite Element Simulation of Groundwater Contamination of Long Island, New York,
W74-02772 5B

PINGRY, D. E.
Multigoal Water Quality Planning Model,
W74-02678 5B

PLYAKA, V. E.
Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

POLOS, L.
Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

POMERANTSEVA, L. G.
Construction of a Map of Average Annual Runoff for North Kazakhstan (Postroyeniye karty normy stoka Severnogo Kazakhstana),
W74-02751 2E

POWERS, J. B.
Weather Modification Operations in California, October 1, 1968 - September 30, 1969,
W74-03056 3B

PRAKASH, A.
Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

PREIS, W. R.
Method for Treating Sewage,
W74-03012 5D

PRENTICE, C. M.
'Maximum Load' Casing Design,
W74-03157 8B

PRESTON-WHYTE, R. A.
Mean Rainfall and Mean Runoff in South Africa; an Investigation into Phase Differences,
W74-02909 2A

PRILL, R. C.
Flow Characteristics of a Subsurface-Controlled Recharge Basin on Long Island, New York,
W74-02734 4B

PRITCHARD, D. W.
A Statement Prepared for Submission at the Public Hearing on Application Made by Baltimore Gas and Electric Company for a Permit to Appropriate and Use Surface Water for Operation of the Calvert Cliffs Nuclear Power Plant Made to the Maryland Department of Water Resources,
W74-02886 5C

PROTASOV, P. V.
Loss of Nitrogen from Various Nitrogen Fertilizers on Irrigated Land,
W74-02936 3F

PULICH, W. M.
Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

PUNGOR, E.
Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

PURNELL, J. H.
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

RAGHAVAN, R.
Stimulation Modes of Geothermal Aquifers,
W74-02876 4B

RAICHLEN, F.
Wave Induced Oscillations in Harbors,
W74-02708 2L

RAINS, B. A.
A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

RAMEY, H. J. JR
Stimulation Modes of Geothermal Aquifers,
W74-02876 4B

RAO, K. V.
Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

RASHID, M. A.
Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

RAUCH, R.
The Federal Water Pollution Control Act Amendments of 1972: Ambiguity as a Control Device,
W74-02784 6E

RECHARD, P. A.
Ablation Characteristics of an Alpine Snow Field in Summer,
W74-02653 2C

REESE, C. D.
The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

REID, J.
The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

REID, K.
The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

REVERA, O. Z.
Conservation of Water Resources and Their Rational Use in the National Economy (Okhrana vodnykh resursov i ikh ratsional'noye ispol'zovaniye v narodnom khozyaystve),
W74-02749 5D

RICHARDS, F. A.
Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

RITCHIE, J. E. JR
Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

ROBERTS, J. A.
Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

ROBINSON, A. H. W.
Residual Currents in Relation to Shoreline Evolution of the East Anglian Coast,
W74-02720 2J

ROBINSON, G. S.
Evolution of the Law of the Seas--Destruction of the Pristine Nature of Basic Oceanographic Research,
W74-02791 6E

ROBINSON, L. H.
Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

ROGERS, W. A.
Isoglaridacris agminis sp. n. (Cestoda: Caryophyllaeidae) from the Lake Chubsucker, Erimyzon sucetta (Lacepede),
W74-03097 2I

ROMANOV, G. A.
Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

ROMEO, G.
Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

ROSE, J. W.
Free Convection Film Condensation of Steam in the Presence of Non-Condensing Gases,
W74-02896 8B

ROSENTHAL, B. C.
Technical and Scientific Journals,
W74-03045 10C

RUBIN, B.
Differential Tolerance of Six Leguminous Crops to Terbutryne,
W74-02941 3F

RUCKENSTEIN, E.
High Reynolds Numbers Unsteady Convective Mass Transfer from Fluid Spheres,
W74-02891 2B

RUSANOVICH, YU. I.
Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

RUSSO, R. D.
Indirector Chlorinator,
W74-02999 5D

SABELEV, G. I.
Calculation of Heat Transfer in Turbulent Flow with Allowance for Secondary Flow,
W74-02904 8B

SAKENA, V. P.
Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

SAKSENA, N. C.
Designing for Future Expansion-Development of Ground Water in India,
W74-03151 4B

SALEEM, Z. A.
Drawdown Distribution Due to Well Fields in Coupled in Coupled Leaky Aquifers, 1. Infinite Aquifer System,
W74-02773 2F

SASAKI, T.
San Diego's Offshore Area,
W74-02831 6F

SATOMI, Y.
On Environmental Factors of Eel Ponds: Chemistry of Water and Soil and Plankton in March and June 1967, (In Japanese),
W74-02933 2H

SCHAAKE, J. JR
Development of a Marginal Analysis Capability for Water Resources Simulation Models,
W74-02682 4A

SCHAERER, P. A.
Observations of Avalanche Impact Pressures,
W74-02747 2C

SCHARF, B. W.
Experimental Ecological Investigations of Chironomus thummi and Chironomus piger (Diptera, Chironomidae). (Experimentell-okologishe Untersuchungen an Chironomus thummi und Chironomus piger (Diptera, Chironomidae),
W74-02963 5C

SCHERLER, A.
Characterization of Sulfite Pulp Bleaching Effluents and Their Behavior During Biodegradation (Abwassertechnische Charakterisierung von Sulfitzellstoffbleicherei-Abwassern und deren Verhalten beim biologischen Abbau),
W74-03073 5D

SCHICHT, R. J.
Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

SCHIFFMAN, A.
Energy Measurements in the Swash-Surf Zone,
W74-02702 2E

SCHILLINGER, G. R.
Application and Operation of Sludge Incineration,
W74-02849 5E

SCHMINCKE, H-U.
Antidune and Chute and Pool Structures in the Base Surge Deposits of the Laacher See Area, Germany,
W74-03063 2J

SCHNEIDER, J.
Lower Fungi as Test Organisms of Pollutants in Sea and Brackish Water: The Effects of Heavy Metal Compounds and Phenol on Thraustochytrium striatum (In German),
W74-02696 5C

SCHOLL, D. G.
Unsaturated Flow Properties Used to Predict Outflow and Evapotranspiration from a Sloping Lysimeter,
W74-02771 2D

SCHROEDER, E. D.
Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

SCHUCK, E. M.
Deep Well Submersibles are Growing,
W74-03147 8C

SCHULTZ, R. W.
Snowmelt Lysimeters Perform Well in Cold Temperatures in Central Colorado,
W74-03067 2C

SCHUMM, S. A.
Rivers as Dynamic Systems,
W74-02857 2E

SCHUTTE, K. H.
Comparative Transpiration Studies of Some Cape Proteas,
W74-02908 2D

SCHWITTERS, J. D.
Calculation of a Solitary Wave Shoaling on a Shallow Slope,
W74-03115 8B

SCOFIELD, F. C.
Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

SCOTT, D.
Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

SCOTT, V. H.
Mutual Interference of Water Wells,
W74-03154 8B

SEVUK, A. S.
Unsteady Flow in Sewer Networks,
W74-03095 5D

SHAPCHENKO, V. M.
Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

SHATTLES, D. E.
A Hydrologic Reconnaissance of the Pascagoula River Estuary, Mississippi,
W74-03094 2L

SHELL, F. J.
The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

SHERRARD, J. H.
Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

SHIMIZU, A.
Odonata of Sugadaira and Vicinity,
W74-02783 2I

SHMIDT, L. I.
Multistage System for Biological Purification of Waste Waters (Mnogostupenchataya sistema biologicheskoi ochistki stochnykh vod),
W74-03072 5D

SHODA, T.
Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

SHORTT, W. A.
Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

SHTEERMAN, V. A.
Thermal Drying of Activated Sludge from Purification Equipment (Termosushka aktivnogo ila ochistnykh sooruzhenii),
W74-03070 5D

SHUMATE, K. S.
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

SIAGIAN, E. G.
The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

SIGVALDASON, O. T.
A Water Quality Simulation Model,
W74-02683 5B

SIMONS, D. B.
Rivers as Dynamic Systems,
W74-02857 2E

SINEV, O. P.
Conservation of Water Resources and Their Rational Use in the National Economy (Okhrana vodnykh resursov i ikh ratsional'noye ispol'zovaniye v narodnom khozyaystve),
W74-02749 5D

SIPKO, L. L.
Higher Water Vegetation and Its Fauna of Krotowaya Laga and Kusgan Lakes (North Kulanda), (In Russian),
W74-02901 2H

SIZER, J. E.
Minnesota Natural Resource Information System,
W74-03053 10B

SMIRNOV, YU. M.
Additional Purification of Chemically Treated Effluents (Doochistka Khimicheski obrabotannykh stochnykh vod),
W74-03071 5D

SMITH, F. W.
Material Property and Boundary Condition Effects on Stresses in Avalanche Snowpacks,
W74-02743 2C

SMITH, G.
Pothole Community Management for Livestock and Wildlife in the Intermountain Region,
W74-03083 4A

SMITH, L.
The Full-Scale Refinement of Purified Sewage for Unrestricted Industrial use in the Manufacture of Fully Bleached Kraft-Pulp and Fine Paper,
W74-02906 5D

SMITH, M. J.
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

SMYTHE, S. J.
Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

SNOWDEN, J. O.
Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

SOHL, W. E.
Method for Separating Oil from Water,
W74-03023 5G

SOLYOM, P.
Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

SOMERS, E. V.
Power Plant Effluent - Thermal Pollution or Energy at a Bargain Price,
W74-02888 5B

SOMMERFELD, R. A.
Statistical Problems in Snow Mechanics,
W74-02745 2C

SOMPPI, L.
A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

SORENSEN, D. B.
Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

SOUTH, W. D.
The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

SPADEA, M. C.
Free Oscillations in the Gulf of Civitavecchia and the Effect of Kinetic Viscosity (Le Oscillazioni Libere Del Golfo Di Civitavecchia E L'azione Della Viscosita Cinematica),
W74-02703 2L

SPERLING, J. A.
Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

SPITZER, C. F.
Digital Magnetic Recording of Wideband Analog Signals,
W74-02982 7C

SPRUILL, E. L.
Color Removal and Sludge Recovery from Total Mill Effluent,
W74-03077 5D

ST, W.
Ultrasonic Emissions in Snow,
W74-02741 2C

STARKEY, E. E.
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

STEELE, D. H.
Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

STEELE, V. J.
Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

STEFANSSON, U.
Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

STEINMETZ, C. JR
Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

STERNBERG, Y. M.
Mutual Interference of Water Wells,
W74-03154 8B

STEWART, G. W.
Feasibility Study: Hydraulic Fracturing of Drilled Water Wells to Stimulate Their Yield,
W74-02659 8B

STEWART, J. I.
Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

STEWART, J. Q.
The Great Atlantic Coast Tides of 5-8 March 1962,
W74-03099 2J

STEYN, D. J.
Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

STRAHLER, A. N.
Quantitative Studies of Beach Morphology and Beach Forming Processes,
W74-03104 2J

STREET, R. L.
An Investigation of the Deformation and Breaking of Solitary Waves,
W74-02694 2E

STRIDE, A. H.
Sediment Transport by the North Sea,
W74-03032 2J

SUBBA RAO, D. V.
Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

SUDO, R.
Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

SUHADI, F.
The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

SULINSKI, S. J.
The Jacking Method in Tunnel Construction,
W74-02855 8A

SUNDERLAND, G. L.
Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

SUNG, K.
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

SUTTON, D. L.
Effect of pH and High Phosphorus Concentrations on Growth of Waterhyacinth,
W74-02934 5C

SVANKS, K.
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

SWANSON, H.
Functional Water and Sewer Report,
W74-03122 3D

SYRETT, P. J.
The Appearance of Nitrate Reductase Activity in Nitrogen-Starved Cells of Ankistrodesmus Braunii,
W74-02929 5C

SZUWALSKI, A.
Coastal Imagery Data Bank: Interim Report,
W74-02701 2L

TABATA, H.
MGCO3 Addition to CASO4 Containing Sea Water to Prevent Corrosion,
W74-03010 3A

TABATA, N.
MGCO3 Addition to CASO4 Containing Sea Water to Prevent Corrosion,
W74-03010 3A

TAKAHASHI, M.
Environmental Control of Phytoplankton Cell Size,
W74-02998 5C

TALBOT, J. W.
The Adsorption of Rhodamine-B on to Materials Carried in Suspension by Inshore Waters,
W74-02721 5B

TAYLOR, H. M.
Effect of Drying on Water Retention of a Puddled Soil,
W74-03186 2G

TAYLOR, P. S.
Water, Land, and Environment Imperial Valley: Law Caought Up in the Winds of Politics,
W74-03127 6E

TETT, P. B.
An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

THACKER, C. L.
Incidence of Vibrio parahaemolyticus in Shellfish from Eight Canadian Atlantic Sampling Areas,
W74-03185 5A

THOMAS, D. M.
A Study of Water Circulation in Monterey Harbor Using Rhodamine B Dye,
W74-03114 2L

THOMAS, V. M. JR
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

THOMPSON, A. D.
Sewage Treatment Vessel,
W74-03016 5D

THOMPSON, C. A. JR
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

THOMPSON, T. W.
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

THOMSON, W. K.
Incidence of Vibrio parahaemolyticus in Shellfish from Eight Canadian Atlantic Sampling Areas,
W74-03185 5A

TILTON, R. C.
Microdilution Antibiotic Susceptibility Test: Examination of Certain Variables,
W74-02968 5A

TIMUR, A.
Pulsed Nuclear Magnetic Resonance Studies of Porosity, Movable Fluid, and Permeability of Sandstones,
W74-03166 8G

TING, Y. Y.
An Ecological Study on the So-Called Mogai (Anadara subcrenata (Lischke)) Cultured in the Kasaoka Bay (In Japanese),
W74-02690 5C

TODD, D. K.
Dispersion of Pollutants in Saturated Porous Media,
W74-03093 5B

TOERIEN, D. F.
Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

TOI, J.
On Environmental Factors of Eel Ponds: Chemistry of Water and Soil and Plankton in March and June 1967, (In Japanese),
W74-02933 2H

TRACHTENBERG, I.
Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

TRENTINI, W. C.
Natural Habitat of Caryophanon latum,
W74-02966 5B

TUBB, R.
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

TUCKER, J. A.
Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

TUDOR, A. J.
Floating Skimmer,
W74-03005 5G

TUDOR, E. E.
Floating Skimmer,
W74-03005 5G

TYAGI, A. K.
Dispersion of Pollutants in Saturated Porous Media,
W74-03093 5B

UDSTUEN, A. J.
Industrial and High Velocity Metering,
W74-02858 5F

UEBEL, J. J.
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

UFFORD, D. E.
Iron Removal Filter System,
W74-03002 5F

VAIDYANADHAM, D.
Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

VAN VUUREN, L. R. J.
The Full-Scale Refinement of Purified Sewage for Unrestricted Industrial use in the Manufacture of Fully Bleached Kraft-Pulp and Fine Paper,
W74-02906 5D

VANDERZANT, C.
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

VEITSER, YU. I.
Determination of Polyacrylamide in the Drinking Water by Means of an Adsorption Photometric Method, (In Russian),
W74-02932 5A

VICHETPAN, N.
Equilibrium Shapes of Coastline in Plan,
W74-03105 2J

VINEGAR, A.
Respiration and Thermal Tolerance of Phyllopod Crustacea Triops longicaudatus and Thamnocephalus platyurus Inhabiting Desert Ephermeral Ponds,
W74-03090 2H

VLADIMIROV, L. A.
Karst Waters of the Caucasus (Karstovyye vody Bol'shogo Kavkaza),
W74-02756 2E

WALDEN, C. C.
Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

WALKER, K. F.
Studies on a Saline Lake Ecosystem,
W74-02920 5C

WALKER, P. H.
Fragmentation of Granitic Quartz in Water,
W74-03065 2J

WALLOVER, J. I.
Continuously Regenerating Active Earth Filtering Apparatus for Liquid wastes,
W74-03004 5D

WALSBY, A. E.
A Portable Apparatus for Measuring Relative Gas Vacuolation, The Strength of Gas Vacuoles, and Turgor Pressure in Planktonic Blue-Green Algae and Bacteria,
W74-02976 5A

WARD, B. Q.
The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

WARD, C. H.
Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

WARD, W. M. S.
The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

WATERS, A. C.
Antidune and Chute and Pool Structures in the Base Surge Deposits of the Laacher See Area, Germany,
W74-03063 2J

WATTS, J. W.
Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

WAWIERNIA, K.
Determination of Furfural in Water and Asphalt (In Polish),
W74-02798 5A

WEIDEMANN, H.
Diffusion,
W74-03030 5B

WEISS, R. L.
Survival of Bacteria in Extreme Environments,
W74-02962 5C

WEISS, S. F.
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

WERSHAW, R. L.
Determination of the Association and Dissociation of Humic Acid Fractions by Small Angle X-Ray Scattering,
W74-02730 2K

WESCHE, T. A.
Parametric Determination of Minimum Streamflow for Trout,
W74-02670 8I

WETHERBEE, T. J.
Benthic Dredge Construction,
W74-03022 8C

WHEELER, V. A.
Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

WHINSTON, A. B.
Multigoal Water Quality Planning Model,
W74-02678 5B

WHIPPLE, W. JR
Institutional Problems in the Water Resources Field,
W74-03183 6B

WHITAKER, L. B.
Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

WHITNEY, D.
Functional Water and Sewer Report,
W74-03122 3D

WHITTINGTON, G. W.
Mean Rainfall and Mean Runoff in South Africa; an Investigation into Phase Differences,
W74-02909 2A

WIERSMA, J. L.
The Role of Rainfall Impact in Soil Detachment and Transport,
W74-02769 2J

WIETING, P. E.
Application and Operation of Sludge Incineration,
W74-02849 5E

WILLARDSON, L. S.
A Flow Path Ground Water Sampler,
W74-03126 7B

WILLEKE, G. E.
Social and Economic Impact on Urban Areas of 'Water Policies for the Future,' the National Water Commission Report,
W74-03177 6B

WILLIAMS, E. H. JR
Isoglaridacris agminis sp. n. (Cestoda: Caryophyllaeidae) from the Lake Chubsucker, Erimyzon sucetta (Lacepede),
W74-03097 2I

WILLIAMS, J. O.
Water-Resources Planning,
W74-02843 6B

WILLISTON, S.
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

WILSON, J. A.
Plant Species as Wildlife Cover and Erosion Control on 'Mudflats' in Iowa's Lareg Reservoir Systems,
W74-02666 4D

WINKLEY, B. R.
Rivers as Dynamic Systems,
W74-02857 2E

WOOD, B. J. B.
An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

WOOD, W. L. JR
Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

WORK, W. M.
Filter Bottom and Molded Module Therefor,
W74-03006 5D

WRIGHT, W. A.
Economic and Social Purposes Related to Water Management,
W74-03197 6B

WUNSCH, C.
On the Mean Drift in Large Lakes,
W74-02762 2H

WURTZ, C. B.
The Realities of Thermal Pollution - Environmental Limitations and Ecological Adaptations,
W74-02870 5C

Water Use for Aquatic Life,
W74-02865 5C

YAMAMOTO, T.
Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

YANGGEN, D.
A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

YASSO, W. E.
Quantitative Studies of Beach Morphology and Beach Forming Processes,
W74-03104 2J

YOSHIOKA, G. A.
Coastal Storms of the Eastern United States,
W74-03098 2B

YOUNG, R. A.
The Role of Rainfall Impact in Soil Detachment and Transport,
W74-02769 2J

ZARCADES, P. A.
On-Line Signal Digitizing for Computer Input,
W74-02950 7C

ZARNOWSKI, J.
The Effect of Ethylenediaminetetraacetic Acid on the Growth of Chlorella Pyrenoidosa and Its Role in the Dynamics of Metabolism and Accessibility of Iron and Calcium,
W74-02925 5C

ZARUBAYEV, N. V.
Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

ZEIKUS, J. G.
Effects of Thermal Additions from the Yellowstone Geyser Basins on the Bacteriology of the Firehole River,
W74-02895 5B

ZOGORSKI, J. S.
Atmospheric Reaeration Capacity of Streams. Part I. Critical Review of Methods Available to Measure and to Calculate the Atmospheric Reaeration Rate Constant,
W74-02916 5C

Atmospheric Reaeration Capacity of Streams. Part II. Direct Measurement of the Atmospheric Reaeration Rate Constant in the Upper Raritan River Basin,
W74-02917 5C

ZUMFT, W. G.
Effect of Nitrite and Nitrate on Chlorophyll Fluorescence in Green Algae,
W74-02928 5C

ORGANIZATIONAL INDEX

ABADAN INST. OF TECH. (IRAN).
Steady and Unsteady Flow Towards Gravity Wells,
W74-03161 4B

ABERDEEN UNIV. (SCOTLAND). SCHOOL OF AGRICULTURE.
The Observation of Micro-Organisms on Surfaces by Incident Fluorescence Microscopy,
W74-02989 5A

ACADEMIA R. S. R., BUCHAREST. INSTITUTUL DE BIOLOGIE.
Hydrochemical Investigations Regarding the River Olt, in the Section of Turnu Rosu Pass, (In Rumanian),
W74-02903 2K

ACADEMIA R. S. R., CLUJ. CENTRUL DE CERCETARI BIOLOGICE.
Contribution to Knowledge about the Algae (Excluding Bacillariophyceae) of Stagnant Waters of the Iron Gates of the Danube,
W74-02699 5C

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, PA. DEPT. OF LIMNOLOGY; AND ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, BENEDICT MD. BENEDICT ESTUARINE LAB.
An Annual Plankton Cycle on the Chesapeake Bay in the Vicinity of Calvert Cliffs, Maryland, June 1969 - May, 1970,
W74-02863 5C

ADVANCED WASTE TREATMENT RESEARCH LAB.
Waste Treatment for Small Flows,
W74-02723 5D

AGRICULTURAL RESEARCH SERVICE, AUBURN, ALA. SOIL AND WATER CONSERVATION RESEARCH DIV.
Effect of Drying on Water Retention of a Puddled Soil,
W74-03186 2G

AGRICULTURAL RESEARCH SERVICE, BRAWLEY, CALIF. IMPERIAL VALLEY CONSERVATION RESEARCH CENTER.
A Flow Path Ground Water Sampler,
W74-03126 7B

AGRICULTURAL RESEARCH SERVICE, MORRIS, MINN. SOIL AND WATER CONSERVATION RESEARCH DIV.
The Role of Rainfall Impact in Soil Detachment and Transport,
W74-02769 2J

AKADEMIYA NAUK SSSR, NOVOSIBIRSK. INSTITUT BIOLOGII.
Higher Water Vegetation and Its Fauna of Krotowaya Laga and Kusgan Lakes (North Kulanda), (In Russian),
W74-02901 2H

AKADEMIYA NAVUK BSSR, MINSK. INST. OF HEAT AND MASS TRANSFER.
On Generalized Hydrodynamic Equations Used in Heat Transfer Theory,
W74-02880 8B

ALABAMA-TOMBIGBEE RIVERS REGIONAL PLANNING AND DEVELOPMENT COMMISSION, CAMDEN.
Comprehensive Regional Water and Sewer Systems Inventory and Analysis,
W74-02837 6B

ALAMO AREA COUNCIL OF GOVERNMENTS, SAN ANTONIO, TEX.
Regional Wastewater Development Plan, Water Quality Planning.
W74-02830 5D

ALASKA UNIV., COLLEGE. INST. OF MARINE SCIENCE.
Trace Metals in a Tundra Pond: Variations in Concentration and Their Effect on Phytoplankton Populations,
W74-02726 2H

The Influence of Dissolved Humic Substances on Trace Metal Phototoxicity,
W74-02727 2H

Lagoon Contributions to Sediments and Water of the Bering Sea,
W74-02728 2H

Electrochemical Measurement of Zinc in Organic-Rich Water,
W74-02729 2H

AMERICAN CHEMICAL SOCIETY, WASHINGTON, D.C.
Primary Publications in Environmental Science,
W74-03044 10A

AMERICAN CYANAMID CO., STAMFORD, CONN. (ASSIGNEE).
Process of Removing Water from Slimes,
W74-03007 5G

AMERICAN UNIV., BEIRUT (LEBANON). DEPT. OF BIOLOGY.
Phytoneuston Ecology of a Temperate Marine Lagoon,
W74-02985 5C

AMOCO PRODUCTION CO., TULSA, OKLA. (ASSIGNEE)
Protecting Offshore Structures from Ice,
W74-03013 8C

AMPEX CORP., REDWOOD CITY, CALIF. INSTRUMENTATION DIV.
Digital Magnetic Recording of Wideband Analog Signals,
W74-02982 7C

ARGONNE NATIONAL LAB., ILL.
Environmental Levels of Radioactivity at Atomic Energy Commission Installations.
W74-03136 5A

ARIZONA UNIV., TUCSON. DEPT. OF HYDROLOGY AND WATER RESOURCES.
Dispersion of Pollutants in Saturated Porous Media,
W74-03093 5B

Uncertainty in the Return Period of Maximum Events: A Bayesian Approach,
W74-03137 2B

A Decision-Theoretic Approach to Uncertainty in the Return Period of Maximum Flow Volumes Using Rainfall Data,
W74-03138 2A

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C.
Hurricane Surge Frequency Estimated for the Gulf Coast of Texas,
W74-02700 2L

Coastal Imagery Data Bank: Interim Report,
W74-02701 2L

Breaker Type Classification on Three Laboratory Beaches,
W74-02712 2E

Source and Distribution of Sediments at Brunswick Harbor and Vicinity, Georgia,
W74-03110 2J

Correlation of Littoral Transport with Wave Energy Along Shores of New York and New Jersey,
W74-03112 2J

ARMY CONSTRUCTION ENGINEERING RESEARCH LAB., CHAMPAIGN, ILL.
An Economic Feasibility Study of Fayetteville, North Carolina, Treating Fort Bragg's Wastewater,
W74-03187 5D

ARMY ENGINEER DISTRICT, MEMPHIS, TENN.
Flood Plain Information for Harris Fork Creek and South Fulton Branch, Fulton, Kentucky and South Fulton, Tennessee.
W74-03125 4A

ARMY ENGINEER DISTRICT, MOBILE, ALA.
Permit Application by Radcliff Materials, Inc.--Dredging of Dead-Reef Shells, Mobile Bay, Alabama (Final Environmental Statement). 21Available NTIS, Springfield, Va. 22151 as EIS-AL-73-0542-F, Price $12.00 printed copy. February 1973. 187 p, 44 ref.
W74-02737 6G

ARMY ENGINEER DISTRICT, NORFOLK, VA.
Chincoteague Inlet, Navigation Project, Accomack County, Virginia (Final Environmental Statement).
W74-02800 8A

ARMY ENGINEER DISTRICT, VICKSBURG, MISS.
Rivers as Dynamic Systems,
W74-02857 2E

ASIAN INST. OF TECH., BANGKOK (THAILAND).
Equilibrium Shapes of Coastline in Plan,
W74-03105 2J

ASPEN SYSTEMS CORP., COLO.
Environmental Law Information System,
W74-03049 10B

ATLAS CHEMICAL INDUSTRIES, INC., WILMINGTON, DEL. (ASSIGNEE)
Granular to Powdered Activated Carbon in Polluted Water Purification Process,
W74-03019 5D

ATMOSPHERIC RESEARCH GROUP, ALTADENA, CALIF.
Investigations of Marine Processes and Coastal Landforms Near Crescent City, California. Volume I. Technical Discussion,
W74-02697 2E

AUBURN UNIV., ALA. DEPT. OF FISHERIES AND ALLIED AQUACULTURES.
Isoglaridacris agminis sp. n. (Cestoda: Caryophyllaeidae) from the Lake Chubsucker, Erimyzon sucetta (Lacepede),
W74-03097 2I

B.C. RESEARCH LTD., VANCOUVER.
Detoxification of Kraft Mill Effluents by Foam Separation,
W74-03084 5D

BATH UNIV. (ENGLAND). SCHOOL OF BIOLOGICAL SCIENCES.
The Microbial Associations Developing on Experimental Trickling Filters Irrigated with Domestic Sewage,
W74-02987 5A

BECHTEL POWER CORP., SAN FRANCISCO, CALIF.
Environmental Challenges and Nuclear Fuels,
W74-02892 5B

BEDFORD INST., DARTMOUTH (NOVA SCOTIA).
Influence of Humic Substances on the Growth of Marine Phytoplankton: Diatoms,
W74-02997 5C

BELL LABS., MURRAY HILL, N.J.
Turbulent Heat Transfer and the Periodic Viscous Sublayer,
W74-02884 8B

BIOLOGICAL STATION, LUNZ AM SEE (AUSTRIA).
On the Systematics and Ecology of the Genus Chamesiphon (Cyanophyceae). 2. Ecology (Zur Systematik und Okologie det Gattung Chamesiphon (Cyanophyceae) 2. Okologie),
W74-02952 5C

BOYLE ENGINEERING, LAS VEGAS, NEV.
Master Water Plan, Las Vegas Valley, (With Map Supplement).
W74-03117 6D

BOYLE ENGINEERING, LAS VEGAS, NEV.; AND CORNELL, HOWLAND, HAYES AND MERRYFIELD, LAS VEGAS, NEV.
Evaluation of Alternates for Water Pollution Control and Resource Management: Phase III, Pollution Abatement Project, Las Vegas Wash and Bay, Annex C.
W74-02834 5D

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF GEOLOGICAL SCIENCES.
Sedimentation on the Western Delta-Front of the Fraser River, British Columbia,
W74-03061 2L

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF SOIL SCIENCE.
A Study of Evapotranspiration from a Douglas Fir Forest Using the Energy Balance Approach,
W74-02764 2D

BRITISH COLUMBIA UNIV., VANCOUVER. INST. OF OCEANOGRAPHY.
Environmental Control of Phytoplankton Cell Size,
W74-02998 5C

BROWN UNIV., PROVIDENCE, R.I. DEPT. OF ECONOMICS.
The Economic Effects of Floods. Investigations of a Stochastic Model of Rational Investment Behavior in the Face of Floods,
W74-03193 6A

BUREAU OF RECLAMATION, DENVER, COLO.
Petrography and Engineering Properties of Igneous Rocks,
W74-03143 8A

Physical Properties of some Typical Foundation Rocks.
W74-03145 8E

BUREAU OF RECLAMATION, SALT LAKE CITY, UTAH.
Crystal Dam, Reservoir, and Powerplant, Curecanti Unit, Colorado River Storage Project, Colorado (Supplement to the Final Environmental Statement).
W74-03130 8A

BUREAU OF RECLAMATION, WASHINGTON, D.C.
Pa Mong Stage one Feasibility Report. Appendix VI. Economic, Agricultural, Social and Financial Analysis.
W74-02686 6B

Pa Mong State One Feasibility Report. Appendix VII. Corollary Studies.
W74-02687 6B

Groundwater Movement,
W74-03142 4B

BUREAU OF SPORT FISHERIES AND WILDLIFE, KEARNEYSVILLE, W. VA. EASTERN FISH DISEASE LAB.
Studies on Selected Myxobacteria Pathogenic for Fishes and on Bacterial Gill Disease in Hatchery-Reared Salmonids,
W74-02672 5C

BUREAU OF SPORT FISHERIES AND WILDLIFE, PROVO, UTAH.
Small Mammals Increase on Recently Cleared and Seeded Juniper Rangeland,
W74-02938 4A

CALIFORNIA INST. OF TECH., PASADENA. W. M. KECK LAB. OF HYDRAULICS AND WATER RESOURCES.
Wave Induced Oscillations in Harbors,
W74-02708 2L

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO.
The California State Water Project Summary: Nineteen-Seventy-Two, Appendix C.
W74-03026 4A

Water Well Standards--Arroyo Grande Basin, San Luis Obispo County,
W74-03057 5B

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO. DIV. OF RESOURCES DEVELOPMENT.
Weather Modification Operations in California, October 1, 1968 - September 30, 1969,
W74-03056 3B

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO. SNOW SURVEYS AND WATER SUPPLY FORECASTING SECTION.
Snow Survey Measurements Through 1970,
W74-02738 2C

CALIFORNIA UNIV., BERKELEY.
Heat Transfer Fouling Through Growth of Calcareous Film Deposits,
W74-02882 8G

Water, Land, and Environment Imperial Valley: Law Caought Up in the Winds of Politics,
W74-03127 6E

CALIFORNIA UNIV., BERKELEY. DEPT. OF BOTANY.
A Portable Apparatus for Measuring Relative Gas Vacuolation, The Strength of Gas Vacuoles, and Turgor Pressure in Planktonic Blue-Green Algae and Bacteria,
W74-02976 5A

CALIFORNIA UNIV., BERKELEY. DEPT. OF MECHANICAL ENGINEERING.
Evaporation Retardation by Monolayers,
W74-02774 3B

CALIFORNIA UNIV. BERKELEY. HYDRAULIC ENGINEERING LAB.
A Function for Sand Movement by Wind,
W74-02689 2J

Sediment Transport by Waves and Currents,
W74-03111 2J

CALIFORNIA UNIV., DAVIS. DEPT. OF WATER SCIENCE AND ENGINEERING.
Functions to Predict Effects of Crop Water Deficits,
W74-02680 3F

CALIFORNIA UNIV., DAVIS. DEPT. OF ZOOLOGY.
The Influence of Eutrophic Lake Sediments on the Growth of Different Planktonic Algae,
W74-02956 5C

CALIFORNIA UNIV., IRVINE. SCHOOL OF ENGINEERING.
Hydrodynamics of Artificial Groundwater Recharge (Saturated Flow Theory),
W74-03091 4B

CALIFORNIA UNIV., LOS ANGELES. DEPT. OF COMPUTER SCIENCE.
New Simulation Approaches to the Modeling of Environmental Systems,
W74-02684 6A

CALIFORNIA UNIV., RIVERSIDE. DEPT. OF BIOLOGY.
Respiration and Thermal Tolerance of Phyllopod Crustacea Triops longicaudatus and Thamnocephalus platyurus Inhabiting Desert Ephermeral Ponds,
W74-03090 2H

CAMP, DRESSER AND MCKEE, INC., PASADENA, CALIF.
Disposal of Brine into An Estuary,
W74-02735 5B

CAPE TOWN UNIV. (SOUTH AFRICA). DEPT. OF BOTANY.
Comparative Transpiration Studies of Some Cape Proteas,
W74-02908 2D

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO. DEPT. OF SYSTEMS ENGINEERING.
Modeling and Management of Water and Related Land Resources for Phosphorus Control and Ecolibrium,
W74-02675 5B

CENTRAL ELECTRICITY GENERATING BOARD, SOUTHAMPTON (ENGLAND). MARINE BIOLOGICAL LAB.
The Cooling Water of Power Stations: A New Factor in the Environment of Marine and Fresh-Water Invertebrates,
W74-02879 5C

Observations on the Response of Some Benthonic Organisms to Power Station Cooling Water,
W74-02881 5C

CHARLOTTE, N.C. USAC PROJECT.
The Liquid Waste Facilities Function Concept.
W74-03039 5D

CHASE ECONOMETRIC ASSOCIATES, INC., NEW YORK.
A Forecasting Model Applied to Pollution Control Costs,
W74-03189 5G

CHEVRON OIL FIELD RESEARCH CO., LA HABRA, CALIF.
Pulsed Nuclear Magnetic Resonance Studies of Porosity, Movable Fluid, and Permeability of Sandstones,
W74-03166 8G

CINCINNATI UNIV., OHIO. DEPT. OF BIOLOGICAL SCIENCES.
Russian-Thistle (Salsola) Species in Western United States,
W74-02945 4A

COAST AND GEODETIC SURVEY, WASHINGTON, D.C.
Tidal Current Surveys by Photogrammetric Methods,
W74-02707 2L

COAST GUARD, YORKTOWN, VA.
U. S. Coast Guard Oil Pollution Investigation and Control School, Investigator's Manual.
W74-03027 5G

COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N.H.
Controlled Release of Avalanches by Explosives,
W74-02746 2C

COLE RESEDEVEL CORP., FAIRLAWN, N.J. (ASSIGNEE)
Method for Treating Sewage,
W74-03012 5D

COLORADO SCHOOL OF MINES, GOLDEN.
Functional Water and Sewer Report,
W74-03122 3D

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
Comparison of Methods of Deriving Unit Hydrographs,
W74-02828 2E

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF MECHANICAL ENGINEERING.
Material Property and Boundary Condition Effects on Stresses in Avalanche Snowpacks,
W74-02743 2C

COLORADO STATE UNIV., FORT COLLINS. ENVIRONMENTAL RESOURCES CENTER.
An Inventory of Environmental Resources Research in Progress, Colorado State University.
W74-03133 6G

COLORADO UNIV., BOULDER. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Individual Home Aerobic Wastewater Treatment Systems,
W74-02668 5D

COLORADO UNIV., BOULDER. DEPT. OF CIVIL ENGINEERING.
Policy Issues Related to Urbanization,
W74-03178 6B

COLUMBIA UNIV., NEW YORK. DEPT. OF GEOLOGY.
Quantitative Studies of Beach Morphology and Beach Forming Processes,
W74-03104 2J

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, CANBERRA (AUSTRALIA). DIV. OF SOILS.
Fragmentation of Granitic Quartz in Water,
W74-03065 2J

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, WEMBLEY (AUSTRALIA). DIV. OF LAND RESOURCES MANAGEMENT.
The Seasonal Growth of Lovegrass (Eragrostis Curvula) on Deep Sandy Soils In A Semi-Arid Environment,
W74-02942 3F

COMPUTER SCIENCES CORP., WASHINGTON, D.C.
Document Services and Referral Activities in Industry and the Federal Government,
W74-03052 10B

CONGRESSIONAL INFORMATION SERVICE, WASHINGTON, D.C.
Document Services and Referral Activities in the Legal, Legislative, and Regulatory Area,
W74-03051 10B

CONNECTICUT UNIV. HELTH CENTER, FARMINGTON.
Microdilution Antibiotic Susceptibility Test: Examination of Certain Variables,
W74-02968 5A

CONTINENTAL CAN CO., INC., HODGE, LA.
Color Removal and Sludge Recovery from Total Mill Effluent,
W74-03077 5D

CONTINENTAL OIL CO., PONCA CITY, OKLA.
Planning and Analysis of Pulse-Tests,
W74-03164 2F

CORE LAB., INC., DALLAS, TEX.
Proper Hydration of Clays for Rock Property Determinations,
W74-03153 2F

CORNELL UNIV., ITACA, N.Y.
Optimal Control of Nitrogen Losses from Land Disposal Areas,
W74-02677 5B

CORNELL UNIV., ITHACA, N.Y. SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Cell Yield and Growth Rate in Activated Sludge,
W74-02960 5C

CORNELL UNIV., ITHACA, N.Y. WATER RESOURCES AND MARINE SCIENCES CENTER.
Development of a Marginal Analysis Capability for Water Resources Simulation Models,
W74-02682 4A

CORPS OF ENGINEERS, OMAHA, NEB.
Boulder Creek Flood Control Project--An Environmental Status Report,
W74-02859 6F

DAIKI ENGINEERING CO. LTD., TOKYO (JAPAN). (ASSIGNEE)
Electrolytic Cell for Electrolysis of Sea Water,
W74-03011 3A

DALHOUSIE UNIV., HALIFAX (NOVA SCOTIA). INST. OF OCEANOGRAPHY.
Decomposition of Marine Copepods,
W74-02973 5A

DELAWARE COUNTY PLANNING COMMISSION, MEDIA, PA.
Sewerage Facilities Plan, in Accordance with the Pennsylvania Sewerage Act (537).
W74-02832 5D

DELAWARE UNIV., NEWARK. COLL. OF MARINE STUDIES.
Research in the Coastal and Oceanic Environment,
W74-03096 2J

DELAWARE UNIV., NEWARK. DEPT. OF CHEMICAL ENGINEERING.
Catalytic Oxidation of Organics in Wastewater,
W74-02655 5D

DELAWARE UNIV., NEWARK. DIV. OF URBAN AFFAIRS.
A Study of the Optimal Mix of Private and Public Action for Local and Regional Water Conservation,
W74-02654 6B

DENVER WATER DEPT., COLO.
The Denver System of Controls,
W74-02854 5F

DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT, OTTAWA (ONTARIO). ENVIRONMENTAL-SOCIETY PROGRAM.
Geobotanical Processes in the Saskatchewan River Delta,
W74-02866 2I

DEPARTMENT OF NATIONAL HEALTH AND WELFARE, OTTAWA (ONTARIO). HEALTH PROTECTION BRANCH.
Incidence of Vibrio parahaemolyticus in Shellfish from Eight Canadian Atlantic Sampling Areas,
W74-03185 5A

DEPARTMENT OF PUBLIC WORKS, BANGKOK (THAILAND). PROVINCIAL WATER SUPPLY DIV.
Ground Water in Thailand,
W74-03150 4B

DEPARTMENT OF THE INTERIOR, WASHINGTON, D.C. (ASSIGNEE).
Dynamics Reverse Osmosis Membranes of Ultrathin Discs,
W74-03009 3A

DEUTSCHES HYDROGARAPHISCHES INSTITUT, HAMBURG (WEST GERMANY).
Diffusion,
W74-03030 5B

DOMTAR LTD. RESEARCH CENTRE, SENNEVILLE (ONTARIO).
The Effect of Pulp and Paper Mill Effluents on Taste and Odour of the Receiving Water and the Fish Therein,
W74-03085 5B

DRESSER INDUSTRIES, INC., OILFIELD PRODUCTS DIV., HOUSTON, TEX.
Easier, More Exact Method Speeds Annulus Pressure-Loss Calculations,
W74-03162 8G

DRILLING WELL CONTROL , INC., LAFAYETTE, LA.
'Maximum Load' Casing Design,
W74-03157 8B

EAST MALLING RESEARCH STATION, MAIDSTONE, (ENGLAND).
Land Use and Water Resources,
W74-03024 2A

EGNER AND NIEDERKORN ASSOCIATES, INC., ITHACA, N.Y.
Summary of the Southern Tier East Regional Plan, Broome and Tioga Counties, New York.
W74-02844 6B

ENTE NAZIONALE PER L'ENERGIA ELETTRICA, ROME (ITALY).
First Experimental Results on the Diffusion of Fresh Water in a shallow bay,
W74-03100 2L

ENVIRONMENTAL IMPACT CENTER, INC., CAMBRIDGE, MASS.
A Methodology for Assessing Environmental Impact of Water Resources Development.
W74-02822 6B

ENVIRONMENTAL PROTECTION AGENCY, ATLANTA, GA. BUREAU OF WATER HYGIENE.
Evaluation of the Tennessee Water Supply Program, Summary.
W74-03158 5G

ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI, OHIO. WATER QUALITY OFFICE.
Storage and Retrieval of Water Quality Data--Training Manual.
W74-03171 5A

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.
National Environmental Information Symposium: An Agenda for Progress--Papers and Reports, Volume 2.
W74-03040 10B

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. OFFICE OF AIR AND WATER PROGRAMS.
Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities.
W74-02946 5G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. OFFICE OF RESEARCH AND MONITORING.
Regional Research Opportunities under EPA Sponsorship,
W74-03176 6B

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. OFFICE OF WATER PROGRAMS.
Petroleum Systems Reliability Analysis, Volume I - Engineering Report, A Program for Prevention of Oil Spills Using an Engineering Approach to a Study of Offshore and Onshore Crude Oil Petroleum Systems,
W74-02947 5G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. WATER QUALITY OFFICE.
Instrumental Analysis of Chemical Pollutants--Training Manual.
W74-02739 5A

ENVIROTECH CORP., BRISBANE, CALIF.
Computer Simulation for Upgrading Existing Wastewater treatment Facilities by Chemical Physical Treatment,
W74-02681 5D

ESSEX MARINE LAB., CONN.
Observations on the Reactions of Young American Shad to a Heated Effluent,
W74-02900 5C

ESSO PRODUCTION RESEARCH CO., HOUSTON, TEX.
Effect of Hardness Reducers on Failure Characteristics of Rock,
W74-03148 8E

FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF ECONOMICS, AND URBAN INST., WASHINGTON, D.C.
Optimal Investment Orders Under Uncertainty and Dynamic Costs: Theory and Estimates,
W74-03199 6B

FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF OCEANOGRAPHY.
Mechanisms Controlling Pore Water Salinities in a Salt Marsh,
W74-02761 2K

FLORIDA STATE UNIV., TALLAHASSEE. INST. OF MOLECULAR BIOPHYSICS.
Effect of Nitrite and Nitrate on Chlorophyll Fluorescence in Green Algae,
W74-02928 5C

FLORIDA UNIV., FORT LAUDERDALE. AGRICULTURAL RESEARCH CENTER.
Effect of pH and High Phosphorus Concentrations on Growth of Waterhyacinth,
W74-02934 5C

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS ROME (ITALY). EUROPEAN INLAND FISHERIES ADVISORY COMMISSION.
Water Quality Criteria for European Freshwater Fish. Reoprt on Ammonia and Inland Fisheries.
W74-02951 5C

FOREST SERVICE (USDA), BERKELEY, CALIF. PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION.
Fog Drip from Artificial Leaves in a Fog Wind Tunnel,
W74-02765 2I

FOREST SERVICE (USDA), DURHAM, N.H. NORTHEASTERN FOREST EXPERIMENT STATION.
Forest Transpiration Greatly Speeds Streamflow Recession,
W74-02766 2D

FOREST SERVICE (USDA), FORT COLLINS, COLO. ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Advances in North American Avalanche Technology: 1972 Symposium.
W74-02740 2C

Statistical Problems in Snow Mechanics,
W74-02745 2C

Snowmelt Lysimeters Perform Well in Cold Temperatures in Central Colorado,
W74-03067 2C

Pressure Bomb Measurements Indicate Water Availability in a Southwestern Riparian Community,
W74-03076 2G

FOREST SERVICE (USDA), LOGAN, UTAH. CACHE NATIONAL FOREST.
Pothole Community Management for Livestock and Wildlife in the Intermountain Region,
W74-03083 4A

FOREST SERVICE (USDA), PINEVILLE, LA. SOUTHERN FOREST EXPERIMENT STATION.
Prescribed Burning Rotations on Pine-Bluestem Range,
W74-02944 4A

FOREST SERVICE (USDA), PROVO, UTAH. INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Ablation Characteristics of an Alpine Snow Field in Summer,
W74-02653 2C

FOREST SERVICE (USDA), TEMPE, ARIZ. FOREST HYDROLOGY LAB.
Unsaturated Flow Properties Used to Predict Outflow and Evapotranspiration from a Sloping Lysimeter,
W74-02771 2D

FRANKLIN INST. RESEARCH LABS., PHILADELPHIA, PA.
Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume II, Bibliography on Marine Biology.
W74-03054 2L

Cooperative Investigation of the Caribbean and Adjacent Regions (Cicar), Volume III, Bibliography on Marine Geology and Geophysics.
W74-03055 2L

FRESHWATER FISHERIES RESEARCH LAB., TOKYO (JAPAN).
On Environmental Factors of Eel Ponds: Chemistry of Water and Soil and Plankton in March and June 1967, (In Japanese),
W74-02933 2H

GENERAL ACCOUNTING OFFICE, WASHINGTON, D.C.
Need to Improve Administration of the Water Pollution Research, Development, and Demonstration Program.
W74-03131 5G

GENERAL ELECTRIC CORPORATE RESEARCH AND DEVELOPMENT, SCHENECTADY, N.Y.
Computerized Digital Data Acquisition System for Thermogravimetry and Similar Applications,
W74-02977 2K

GEOLOGICAL SURVEY, AIKEN, S.C., SAVANNAH RIVER PLANT.
Computing the Barometric Efficiency of a Well,
W74-03167 8B

GEOLOGICAL SURVEY, ALBANY, N.Y.
Effects of Migratory Waterfowl on Water Quality at the Montezuma National Wildlife Refuge, Seneca County, New York,
W74-02733 5B

GEOLOGICAL SURVEY, BISMARCK, N.DAK.
Ground-Water Basic Data for Griggs and Steele Counties, North Dakota,
W74-02776 2F

GEOLOGICAL SURVEY, JACKSON, MISS.
A Hydrologic Reconnaissance of the Pascagoula River Estuary, Mississippi,
W74-03094 2L

GEOLOGICAL SURVEY, LAKEWOOD, COLO.
Water Resources Data for Colorado, 1972: Part 1. Surface-Water Records.
W74-02724 7C

Determination of the Association and Dissociation of Humic Acid Fractions by Small Angle X-Ray Scattering,
W74-02730 2K

Fluorescent Spectroscopy, A Technique for Characterizing Surface Films,
W74-02731 5A

GEOLOGICAL SURVEY, MINEOLA, N.Y.
Flow Characteristics of a Subsurface-Controlled Recharge Basin on Long Island, New York,
W74-02734 4B

GEOLOGICAL SURVEY OF INDIA, HYDERABAD. SOUTHERN REGIONAL CHEMICAL LAB.
Uptake of Flouride by Water Hyacinth, Eichhornia crissipes,
W74-02970 5C

GEOLOGICAL SURVEY OF PUERTO RICO, SAN JUAN.
Water Resources of the Ponce Area, Puerto Rico,
W74-03038 4A

GEOLOGICAL SURVEY, RALEIGH, N.C.
Problems of Underground Storage of Wastes,
W74-02732 5B

GEOLOGICAL SURVEY, WASHINGTON, D.C.
Surface Water Supply of the United States, 1966-70--Part 6. Missouri River Basin: Volume 2. Missouri River Basin from Williston, North Dakota, to Sioux City, Iowa.
W74-03035 7C

Fractionation and Characterization of Natural Organic Matter from Certain Rivers and Soils by Free-Flow Electrophoresis,
W74-03062 2K

GEOLOGICAL SURVEY, WASHINGTON, D.C., WATER RESOURCES DIV.
Cross Correlation of the Logarithms of Estimates of Mean Streamflows,
W74-02775 2E

Temperature of Missouri Streams,
W74-02885 2K

GEOLOGICAL SURVEY, WOODS HOLE, MASS.
Sea Level as Affected by River Runoff, Eastern United States,
W74-02709 2E

GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
The Rise and Fall of Natural Resource Systems,
W74-02786 6E

GEORGE WASHINGTON UNIV., WASHINGTON, D.C. NATURAL RESOURCES POLICY CENTER.
Value Comparisons in Free-Flowing Stream Development,
W74-03190 6B

GEORGIA INST. OF TECH., ATLANTA. ENVIRONMENTAL RESOURCES CENTER.
Social and Economic Impact on Urban Areas of 'Water Policies for the Future,' the National Water Commission Report,
W74-03177 6B

GEORGIA INST. OF TECH., ATLANTA. SCHOOL OF CHEMISTRY.
Influence of Solvation Factors on Acidity. Volumes of Ionization of the Meta and Para Isomers of Nitrophenol and Formylphenol in Water at 25 deg,
W74-03139 1B

Thermodynamics of Acid-Base Equilibria. III. Ionization of Substituted Anilinium Ions,
W74-03140 1B

GILBERT ASSOCIATES, INC., READING, PA.
Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania; Volume I--General, Sewerage Planning, Appendices.
W74-02861 6E

Master Plan for Water Supply and Wastewater Management in Luzerne County, Pennsylvania: Volume 2--Water Planning.
W74-02862 6E

GORKOVSKII GOSUDARSTVENNYI PEDAGOGICHESKII INSTITUT (USSR).
A Horizontal Distribution of Oribatids in Exhausted Peat-Bogs of the Balachninskaya Lowland, (In Russian),
W74-02820 2H

GOSUDARSTVENNYI KOMITET PO ISPOLZOVANIYU ATOMNOI ENERGII SSSR, OBNINSK. FIZIKO-ENERGETICHESKII INSTITUT.
Calculation of Heat Transfer in Turbulent Flow with Allowance for Secondary Flow,
W74-02904 8B

GOTENBURG UNIV. (SWEDEN). DEPT. OF ANALYTICAL CHEMISTRY.
A Fluorimetric Determination of Lignin Sulfonates from Natural Waters in Presence of Humic Substances,
W74-03079 5A

GREATER CHICAGO METROPOLITAN SANITARY DISTRICT, ILL.
Engineering Work Leading to a Rock Tunnel Plan,
W74-02853 8A

The Jacking Method in Tunnel Construction,
W74-02855 8A

HAWAII UNIV., HONOLULU. DEPT. OF CHEMISTRY.
Computer Analysis of Data from Potentiometric Titrations Using ion-Selective Indicator Electrodes,
W74-02978 2K

HAWAII UNIV., HONOLULU. WATER RESOURCES RESEARCH CENTER.
Annual Report, '71-'72.
W74-03092 5G

HEBREW UNIV., JERUSALEM (ISRAEL). DEPT. OF METEOROLOGY.
Computation of the Sensible Heat Flux and Its Relation to Other Components of the Heat Balance at the Surface,
W74-02940 2D

HEBREW UNIV., REHOVOT (ISRAEL). DEPT. OF FIELD AND VEGETABLE CROPS.
Differential Tolerance of Six Leguminous Crops to Terbutryne,
W74-02941 3F

HELSINKI UNIV. OF TECHNOLOGY, (FINLAND). DEPT. OF FOREST PRODUCTS.
Effluent Treatment Plants in the Forest Products Industry (Puunjalostusteollisuuden jatevesipuhdistamot),
W74-03087 5D

HENSLEY-SCHMIDT, INC., CHATTANOOGA, TENN.
Comprehensive Water and Sewer Study, Hamilton, Walker, and Catoosa Counties, (Book Two).
W74-02833 5D

HILLSBOROUGH COUNTY PLANNING COMMISSION, TAMPA, FLA.
Hillsborough County, Florida: Population Projections and Environmental Factors.
W74-02838 6D

HIROSHIMA UNIV. (JAPAN). FACULTY OF FISHERIES AND ANIMAL HUSBANDRY.
An Ecological Study on the So-Called Mogai (Anadara subcrenata (Lischke)) Cultured in the Kasaoka Bay (In Japanese),
W74-02690 5C

HUMBLE OIL AND REFINING CO., HOUSTON, TEX.
Wellbore Pressure Surges Produced by Pipe Movement,
W74-03146 8B

IDAHO UNIV., MOSCOW. COLL. OF FORESTRY.
Simulation Model for Evaluation of Interception Loss from Forest Trees, Part I. Modeling Snow Interception on Conifers and Part II. Laboratory Modeling of Snow Interception on Trees,
W74-02656 2I

ILLINOIS INST. FOR ENVIRONMENTAL QUALITY, CHICAGO.
Lake Michigan Discharge Studies.
W74-02954 5B

ILLINOIS STATE DEPT. OF MINES AND MINERALS, SPRINGFIELD. DIV. OF OIL AND GAS.
Sealing Abandoned Water Wells.
W74-03169 8F

ILLINOIS STATE WATER SURVEY, URBANA.
Development in Deep Sandstone Aquifer Along the Illinois River in La Salle County,
W74-03163 4B

ILLINOIS UNIV., CHICAGO. DEPT. OF GEOLOGICAL SCIENCES.
Drawdown Distribution Due to Well Fields in Coupled in Coupled Leaky Aquifers, 1. Infinite Aquifer System,
W74-02773 2F

ILLINOIS UNIV., URBANA.
Flood Control Project Planning by Mathematical Programming: A Project-Expansion Approach,
W74-02674 4A

ILLINOIS UNIV., URBANA. DEPT. OF CIVIL ENGINEERING.
Unsteady Flow in Sewer Networks,
W74-03095 5D

INDIANA UNIV., BLOOMINGTON.
Survival of Bacteria in Extreme Environments,
W74-02962 5C

Mutual Interference of Water Wells,
W74-03154 8B

INDIANA UNIV., INDIANAPOLIS. DEPT. OF MICROBIOLOGY.
Effects of Thermal Additions from the Yellowstone Geyser Basins on the Bacteriology of the Firehole River,
W74-02895 5B

INSTITUTE FOR SOIL FERTILITY, GRONINGEN (NETHERLANDS).
Occurrence and Behaviour of Heavy Metals in River Deltas, with Special Reference to the Rhine and EMS Rivers,
W74-03034 5B

INSTITUTE OF HYDROLOGY, WALLINGFORD (ENGLAND).
Use of Censored Data in the Estimation of Gumbel Distribution Parameters for Annual Maximum Flood Series,
W74-02763 2E

INSTITUTE OF PAPER CHEMISTRY, APPLETON, WIS. DIV. OF INDUSTRIAL AND ENVIRONMENTAL SYSTEMS.
Toxicity of Sodium Sulfide to Common Shiners -- Dynamic Bioassay,
W74-03075 5C

INSTITUTE OF PAPER CHEMISTRY, APPLETON, WIS. DIV. OF NATURAL MATERIALS AND SYSTEMS.
Determination of Phosphorus in Waste Waters from the Pulp and Paper Industry,
W74-03069 5A

INSTYTUT UPRAWNY NOWOZENIA I GLEBOZNAWSTWA, WROCLAW (POLAND).
Investigation on the Ecology and Control of Wild Oat (Avena fatua L.) Under the Conditions in Wroclaw Voivodeship, (In Polish),
W74-02921 3F

INSTYTUT ZOOTECHNIKI, OSWIECIM (POLAND). SAMODZIELNA PRACOWNIA BIOLOGII RYB I STRODOWISKA WODNEGO.
The Effect of Ethylenediaminetetraacetic Acid on the Growth of Chlorella Pyrenoidosa and Its Role in the Dynamics of Metabolism and Accessibility of Iron and Calcium,
W74-02925 5C

IOWA STATE CONSERVATION COMMISSION, DES MOINES. FISHERIES SECTION.
Population Studies of Bigmouth Buffalo in Coralville Reservoir with Special Reference to Commercial Harvest,
W74-03036 8I

IOWA STATE UNIV., AMES. DEPT. OF BOTANY AND PLANT PATHOLOGY.
Plant Species as Wildlife Cover and Erosion Control on 'Mudflats' in Iowa's Lareg Reservoir Systems,
W74-02666 4D

IRRIGATION RESEARCH INST., LAHORE (PAKISTAN).
Measures for Better Utilization of Irrigation Potential in the Arid and Semi-Arid Zones of West Pakistan and a Proposal for Future Coordinated Research Activities in This Field Suited to the Cento Region,
W74-02939 3F

J. L. B. SMITH INST. OF ICHTHYOLOGY, GRAHAMSTOWN (SOUTH AFRICA).
Preliminary Report on Small Fishes From the Hendrik Verwoed Dam, Orange River,
W74-02914 2H

JOHNS HOPKINS UNIV., BALTIMORE, MD.
Characteristics of Steam Electric Condenser Cooling Waters,
W74-02869 5B

JOHNS HOPKINS UNIV., BALTIMORE, MD. CHESAPEAKE BAY INST.
A Statement Prepared for Submission at the Public Hearing on Application Made by Baltimore Gas and Electric Company for a Permit to Appropriate and Use Surface Water for Operation of the Calvert Cliffs Nuclear Power Plant Made to the Maryland Department of Water Resources,
W74-02886 5C

KANSAS WATER RESOURCES RESEARCH INST., MANHATTAN.
Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume I, Time Series Analysis in Water Quality Modeling,
W74-02823 5B

Analysis, Modeling and Forecasting of Stochastic Water Quality Systems, Volume II, Nonlinear Filtration and Estimation in Water Quality Modeling,
W74-02824 5B

KHARTOUM UNIV. (SUDAN). FACULTY OF SCIENCE.
Burning as a Supporting Treatment in Controlling Waterhyacinth in the Sudan. Part I. Routine Burning,
W74-02918 4A

Burning as a Supporting Management in the Control of Waterhyacinth in the Sudan. Part II. Backburning,
W74-02919 4A

KIEL UNIV. (WEST GERMANY). INSTITUT FUER MEERESKUNDE.
Lower Fungi as Test Organisms of Pollutants in Sea and Brackish Water: The Effects of Heavy Metal Compounds and Phenol on Thraustochytrium striatum (In German),
W74-02696 5C

KOEHLER-DAYTON, INC., NEW BRITAIN CONN. (ASSIGNEE).
Indirector Chlorinator,
W74-02999 5D

KRANNERT GRADUATE SCHOOL OF INDUSTRIAL ADMINISTRATION, LAFAYETTE, IND.
Multigoal Water Quality Planning Model,
W74-02678 5B

KSB PUMP CO., EAST RUTHERFORD, N.J.
Deep Well Submersibles are Growing,
W74-03147 8C

LA PLATA UNIV. (ARGENTINA). ESTACION HIDROBIOLOGICA Y ACUARIO DE BERISSO.
Pollution of the 'El Carpincho' Pond (Pampasic Region, Argentina) and Its Effects on Plankton and Fish Communities,
W74-02923 5C

LA SALLE COLL., PHILADELPHIA, PA.
The Realities of Thermal Pollution - Environmental Limitations and Ecological Adaptations,
W74-02870 5C

LA SALLE COLL., PHILADELPHIA, PA. DEPT. OF BIOLOGY.
Water Use for Aquatic Life,
W74-02865 5C

LAKEHEAD UNIV., THUNDER BAY (ONTARIO). DEPT. OF BIOLOGY.
A Procedure for Short-Term Bioassay Tests on Industrial Effluents of Low Oxygen Content,
W74-02961 5C

LEHIGH-NORTHAMPTON COUNTIES JOINT PLANNING COMMISSION, LEHIGH VALLEY, PA.
Water Supply and Sewage Facilities Plan Update--1970, Lehigh-Northampton Counties, Pennsylvania.
W74-02848 5D

4 Water Pollution, Environmental Enhancement Study.
W74-02856 5G

LEICESTER UNIV. (ENGLAND). DEPT. OF GEOGRAPHY.
Residual Currents in Relation to Shoreline Evolution of the East Anglian Coast,
W74-02720 2J

LIBRARY OF CONGRESS, WASHINGTON, D.C.
Introduction to Legal, Legislative and Regulatory Session of National Environmental Protection Symposium,
W74-03048 10B

LIBRARY OF CONGRESS, WASHINGTON, D.C. SCIENCE AND TECHNOLOGY DIV.
Referral Activities and Other Non-Bibliographic Information Services,
W74-03047 10B

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS.
The movement and Impact of Pesticides Used for Vector Control on the Aquatic Environment in the Northeastern United States,
W74-02948 5B

LIVERPOOL POLYTECHNIC (ENGLAND). DEPT. OF MECHANICAL, MARINE AND PRODUCTION ENGINEERING.
Theoretical Analysis of Forced Laminar Convection Heat Transfer in the Entrance Region of an Elliptic Duct,
W74-02897 8B

LOMAX AND ASSOCIATES, ALBUQUERQUE, N. MEX.
Eagle Nest Lake: Revised Appraisal.
W74-03188 6B

LOS ANGELES COUNTY SANITATION DISTRICT, CALIF.
Regional Planning for Sewerage Systems,
W74-02860 6A

LOUISIANA STATE UNIV., BATON ROUGE.
Well Imaging and Fault Detection in Anisotropic Reservoirs,
W74-03168 8B

LOUISIANA STATE UNIV., NEW ORELEANS.
Chemical Quality of Surface and Sediment Pore Water in Louisiana and Mississippi Estuaries,
W74-02825 5A

LOUISIANA WILD LIFE AND FISHERIES COMMISSION, NEW ORLEANS.
A Study of Commercially Important Estuarine-Dependent Industrial Fishes,
W74-02839 6C

LUND UNIV. (SWEDEN). LIMNOLOGICAL INST.
A Microbenthos Study of Rotatoria,
W74-02893 2H

ACDONALD COLL., MONTREAL (QUEBEC).
Soil Type, Moisture, Temperature and the Longevity of a Nematode Species of the Genus Tylenchorhynchus in the Absence of Plants,
W74-02719 2I

ACMILLAN BLOEDEL LTD., POWELL IVER (BRITISH COLUMBIA). POWELL IVER DIV.
Biological Surveys: Intent, Methodology, Interpretation,
W74-03086 5C

AGYAR TUDOMANYOS AKADEMIA, IHANY. BIOLOGICAL RESEARCH INST.
Electron Microscopic Investigation of Natural Bacterial Populations in the Water and Sediment of Lake Balaton and Lake Belso,
W74-02725 5A

ARYLAND DEPT. OF NATURAL ESOURCES, ANNAPOLIS. WATER ESOURCES ADMINISTRATION.
An Overview of Maryland's Sediment Control Program,
W74-02852 5G

ASSACHUSETTS INST. OF TECH., AMBRIDGE.
On the Mean Drift in Large Lakes,
W74-02762 2H

ASSACHUSETTS INST. OF TECH., AMBRIDGE. DEPT. OF CIVIL NGINEERING.
The Legal and Regulatory Framework for Thermal Discharge from Nuclear Power Plants,
W74-02875 5G

ASSACHUSETTS INST. OF TECH., AMBRIDGE. RALPH M. PARSONS LAB. FOR ATER RESOURCES AND YDRODYNAMICS.
Mass Transport in Water Waves. Part I. Theory. Part II. Experiments,
W74-03108 2J

ASSACHUSETTS UNIV., AMHERST. DEPT. F AGRICULTURAL AND FOOD CONOMICS.
Economic Criteria for Decisions on Preservation and Alteration of Natural Resources with Specific Reference to Freshwater Wetlands in Massachusetts,
W74-02671 6B

ASSACHUSETTS UNIV., AMHERST. DEPT. F GEOLOGY.
Diversion of Flood Flows from the Connecticut River and the Effect on Groundwater Supplies,
W74-02847 4B

ASSACHUSETTS UNIV., AMHERST. DEPT. F LANDSCAPE ARCHITECTURE AND EGIONAL PLANNING.
Model for Landscape Resource Assessment, Part I of the 'Metropolitan Landscape Planning Model' (METLAND),
W74-02657 6B

ASSACHUSETTS UNIV., AMHERST. WATER ESOURCES RESEARCH CENTER.
Partial Recovery of a Vegetation in a Pollution Damaged Marsh,
W74-02663 5C

Water Quality Issues in the National Water Commission's Report 'Water Policies for the Future',
W74-03179 6B

MAX-PLANCK-INSTITUT FUER LIMNOLOGIE ZU PLOEN (WEST GERMANY).
The Effect of pH, C02-Concentration and Bacteria on the Growth of the Blue-Green Alga Oscillatoria redekei Van Goor (Einfluss von pH, C02-Konzentration und bakterien auf das Wachsium der Blaualge Oscillatoria redekei Van Goor),
W74-02965 5C

MAX-PLANCK-INSTITUT FUER LIMNOLOGIE ZU PLOEN (WEST GERMANY). DEPT OF TROPICAL ECOLOGY.
Experimental Ecological Investigations of Chironomus thummi and Chironomus piger (Diptera, Chironomidae). (Experimentell-okologishe Untersuchungen an Chironomus thummi und Chironomus piger (Diptera, Chironomidae),
W74-02963 5C

MEDITSINSKII INSTITUT, IRKUTSK (USSR).
Effect of Hydrolysis Plant Effluents on Fish (Vliyanne na ryb stochnykh vod gidroliznogo zavoda),
W74-03074 5C

MEMORIAL UNIV. OF NEWFOUNDLAND, ST. JOHN'S. DEPT. OF BIOLOGY.
Plankton Dynamics in a Newfoundland Lake,
W74-02926 5C

Some Aspects of the Biology of Calliopius laeviusculus (Kroyer) (Crustacea, Amphipoda) in the Northwestern Atlantic,
W74-02958 5B

META SYSTEMS, INC., CAMBRIDGE, MASS.
A Water Quality Simulation Model,
W74-02683 5B

MIAMI UNIV., OXFORD, OHIO. DEPT. OF ZOOLOGY.
Acton Lake: Biology of Its Benthos and Notes on Its Physical Limnology 1959-1970,
W74-03066 2H

MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF NATURAL SCIENCE.
Horizontal Particle Velocity Profiles Beneath the Crests of Waves Breaking on a Submarine Bar,
W74-03107 2H

MIDWEST RESEARCH INST., KANSAS CITY, MO.
The Pollution Potential in Pesticide Manufacturing.
W74-02685 5C

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, LOWESTOFT, (ENGLAND).
Currents and Water Masses,
W74-03029 2E

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD, LOWESTOFT (ENGLAND). FISHERIES LAB.
The Adsorption of Rhodamine-B on to Materials Carried in Suspension by Inshore Waters,
W74-02721 5B

MINISTRY OF NATURAL RESOURCES THUNDER BAY (ONTARIO). FISHERIES RESEARCH BRANCH.
Effects of Temperature on Embryonic Development of Lake Herring (Coregonus artedii),
W74-02878 5C

MINNESOTA MINING AND MFG. CO., ST. PAUL. (ASSIGNEE)
Method for Separating Oil from Water,
W74-03023 5G

MINNESOTA STATE PLANNING AGENCY, ST. PAUL. ENVIRONMENTAL QUALITY PLANNING.
Minnesota Natural Resource Information System,
W74-03053 10B

MISSOURI UNIV. ROLLA. DEPT. OF MECHANICAL AND AEROSPACE ENGINEERING.
Thermal Radiative Properties of a Smooth Air-Water Interface,
W74-02874 2K

MISSOURI WATER RESOURCES RESEARCH CENTER, COLUMBIA.
An Analytical Method for Total Heavy Metal Complexing Agents in Water and its Application to Water Quality Studies,
W74-02658 5A

MOBIL RESEARCH AND DEVELOPMENT CORP., DALLAS, TEX.
Estimating Skin Effect in a Partially Completed Damaged Well,
W74-03149 8B

MONASH UNIV., CLAYTON (AUSTRALIA). DEPT. OF ZOOLOGY.
Studies on a Saline Lake Ecosystem,
W74-02920 5C

MONTANA STATE UNIV., BOZEMAN. DEPT. OF CIVIL ENGINEERING AND ENGINEERING MECHANICS.
On the Mechanics of the Hard Slab Avalanche,
W74-02744 2C

MONTANA STATE UNIV., BOZEMAN. DEPT. OF EARTH SCIENCES.
Ultrasonic Emissions in Snow,
W74-02741 2C

MONTGOMERY COUNTY SANITARY DEPT., DAYTON, OHIO.
Solids Waste Disposal.
W74-02840 5D

MOSCOW STATE UNIV. DEPT. OF SOIL MELIORATION.
Magnetic Susceptibility of the Excess Temporary Moistening of Soils, (in Russian),
W74-02877 2G

MOSCOW STATE UNIV. (USSR). DEPT. OF HYDROBIOLOGY.
Construction of a Map of Average Annual Runoff for North Kazakhstan (Postroyeniye karty normy stoka Severnogo Kazakhstana),
W74-02751 2E

Investigation of Correlation of Annual Runoff for Appalachian Rivers (Issledovaniye korrelyativnoy svyazi godovogo stoka Appalachskikh rek),
W74-02752 2E

Role of Depth of Channel Downcutting in the Formation of Low Flow in Mountain Streams (Rol' glubiny vreza rusel v formirovanii mazhennogo stoka gornykh rek),
W74-02753 2E

MOUNT ALLISON UNIV., SACKVILLE (NEW BRUNSWICK). DEPT. OF BIOLOGY.
Natural Habitat of Caryophanon latum,
W74-02966 5B

MUSKINGUM COLL., NEW CONCORD, OHIO. DEPT. OF BIOLOGY.
Effects of Temperature on Growth and Survival of Laboratory Reared Larvae of the Scaled Sardine, Harengula pensacolae Goode and Bean,
W74-02899 5C

NALCO CHEMICAL CO., CHICAGO, ILL. (ASSIGNEE)
Oil Removal from Waste Waters,
W74-03020 5D

NATAL UNIV., DURBAN (SOUTH AFRICA); AND SAINT ANDREWS UNIV.
Mean Rainfall and Mean Runoff in South Africa; an Investigation into Phase Differences,
W74-02909 2A

NATAL UNIV., PIETERMARITZBURG (SOUTH AFRICA).
The Content of Water Vapour in the Atmosphere Over Southern Africa,
W74-02913 2B

NATIONAL ATOMIC ENERGY AGENCY, DJAKARTA (INDONESIA). PASAR DJUMAT RESEARCH CENTRE.
The Presence of Clostridium botulinum in Indonesian Waters,
W74-02986 5A

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
Information Centers Concerned with Environmental Matters: Physical Science and Technology,
W74-03042 10D

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
A Numerical Model of Coastal Upwelling,
W74-02713 2E

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO. ANALYTICAL QUALITY CONTROL LAB.
Description and Ecology of Three Stenonema Mayfly Nymphs,
W74-02953 5A

NATIONAL INST. FOR WATER RESEARCH, PRETORIA (SOUTH AFRICA).
The Full-Scale Refinement of Purified Sewage for Unrestricted Industrial use in the Manufacture of Fully Bleached Kraft-Pulp and Fine Paper,
W74-02906 5D

Application of Algal Bioassays in Eutrophication Analyses,
W74-02907 5C

NATIONAL INST. FOR WATER RESEARCH, WINDHOEK (SOUTH-WEST AFRICA).
Survey of Rain Run-Off Harvesting,
W74-02915 3B

NATIONAL INST. OF OCEANOGRAPHY, WORMLEY (ENGLAND).
Sediment Transport by the North Sea,
W74-03032 2J

NATIONAL MARINE FISHERIES SERVICE, NARRAGANSETT, R.I. NARRAGANSETT LAB.
Influence of Temperature on Energy Utilization of Embryonic and Prolarval Tautog, Tautoga onitis,
W74-02872 5C

NATIONAL MARINE FISHERIES SERVICE, SEATTLE, WASH. NORTHWEST FISHERIES CENTER.
Predation, Particularly by Sculpins, on Salmon Fry in Fresh Waters of Washington,
W74-03058 2I

NATIONAL MARINE FISHERIES SERVICE, TIBURON, CALIF. TIBURON FISHERIES LAB.
Larval Fish Survey of Humboldt Bay, California,
W74-03059 2L

NATIONAL MARINE FISHERIES SERVICE, WOODS HOLE, MASS. NORTHEAST FISHERIES CENTER.
Temperature Trends and the Distribution of Groundfish in Continental Shelf Waters, Nova Scotia to Long Island,
W74-02867 5C

NATIONAL OCEANOGRAPHIC DATA CENTER, WASHINGTON, D.C.
Federal Environmental Data Centers and Systems,
W74-03043 10D

NATIONAL PARK SERVICE, SANTA FE, N. MEX.
Pollution Abatement Project, Bandelier National Monument, New Mexico (Final Environmental Impact Statement).
W74-02801 5D

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA, (ONTARIO). DIV. OF BUILDING RESEARCH.
Observations of Avalanche Impact Pressures,
W74-02747 2C

NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.
Document Services,
W74-03046 10C

NATIONAL WATER QUALITY LAB., DULUTH, MINN.
Thermal Requirements for Maturation, Spawning, and Embryo Survival of the Brook Trout, Salvelinus fontinalis,
W74-02868 5C

NATIONAL WATER WELL ASSOCIATION, HOUSTON, TEX., RESEARCH FACILITY.
Engineering Economics of Rural Water Systems: A New American Approach,
W74-03152 6B

Terradynamics,
W74-03165 8E

NATURAL ENVIRONMENT RESEARCH COUNCIL, ANGLESEY (WALES). UNIT OF MARINE INVERTEBRATE BIOLOGY.
Biochemical Effects of Temperature and Nutritive Stress on Mytilus edulis L,
W74-02873 5C

NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
Feasibility of Modeling Run-up Effects of Dispersive Water Waves,
W74-03106 8B

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Study of Time Variability of Surface Currents at a Point in Monterey Bay,
W74-02692 2L

The Southern Monterey Bay Littoral Cell: A Preliminary Sediment Budget Study,
W74-02695 2L

Sand Budget for Capitola Beach, California,
W74-02718 8B

A Study of Water Circulation in Monterey Harbor Using Rhodamine B Dye,
W74-03114 2L

NEBRASKA UNIV., LINCOLN.
Reuse Irrigation Cuts Costs,
W74-03194 3D

NETHERLANDS INST. OF OCEANOGRAPHY, TEXEL.
Sediment Distribution in the North Sea in Relation to Marine Pollution,
W74-03033 5B

NEVADA UNIV., RENO. DESERT RESEARCH INST.
Seismic-Refraction and Earth-Resistivity Investigation of Hydrogeologic Problems in the Humboldt River Basin, Nevada,
W74-03155 2F

NEW HAMPSHIRE UNIV., DURHAM. DEPT. OF BIOCHEMISTRY.
Sulfur and the Toxicity of the Red Alga Ceramium rubrum to Bacillus subtilis,
W74-02959 5C

NEW HAMPSHIRE UNIV., DURHAM. INST. OF NATURAL AND ENVIRONMENTAL RESOURCES.
The Measurement of the Heat of Reaction Between Proteins and Clay Minerals by Microcalorimetry,
W74-02669 2G

NEW JERSEY COUNTY AND MUNICIPAL GOVERNMENT STUDY COMMISSION, TRENTON.
Water Quality Management: New Jersey's Vanishing Options.
W74-02841 5G

NEW MEXICO STATE UNIV., UNIVERSITY PARK. DEPT. OF AGRICULTURAL ECONOMICS.
An Analytical Interdisciplinary Evaluation of the Utilization of the Water Resources of the Rio Grande in New Mexico: Upper Rio Grande,
W74-02660 6B

NEW MEXICO UNIV., ALBUQUERQUE. DEPT. OF ECONOMICS.
Economic Policy for Water Resources and Placement Flows,
W74-03191 4B

NEW SOUTH WALES UNIV., KENSINGTON (AUSTRALIA).
A Preliminary Investigation of the Recent Sediments Off the East Coast of Australia,
W74-02714 2J

NEW YORK STATE COLL. OF AGRICULTURAL AND LIFE SCIENCES, ITHACA. DEPT. OF AGRICULTURAL ECONOMICS.
A Challenge to the Academic Community Economics and Institutions in the Report of the National Water Commission,
W74-03184 6E

EW YORK STATE DEPT. OF NVIRONMENTAL CONSERVATION, LBANY.
Active Projects, Pure Waters Research.
W74-02851 5D

EW YORK UNIV., N.Y.
High Reynolds Numbers Unsteady Convective Mass Transfer from Fluid Spheres,
W74-02891 2B

EWCASTLE UNIV. COLL. (AUSTRALIA).
Observations on Floating Breakwaters for Reflection of Shallow Water Waves (Recherches Sur Les Brise-Lames Flottants Destines A Reflechir La Houle En Eau Peu Profonde),
W74-02693 2J

ORANDA RESEARCH CENTRE, POINTE LAIRE (QUEBEC).
Henneguya Sp. (Sporozoa:Myxosporida) As A Probable Cause of Death of Esox Niger in Brome Lake, Quebec,
W74-03025 2H

ORTH CAROLINA STATE DEPT. OF WATER ND AIR RESOURCES, RALEIGH.
North Carolina Water Plan Progress Report: Chapter 19: Power and Water.
W74-02836 3D

ORTH CAROLINA STATE UNIV., RALIEGH. EPT. OF ZOOLOGY.
Output of Phosphorus, Dissolved Organic Carbon, and Fine Particulate Carbon from Hubbard Brook Watersheds,
W74-02759 2K

ORTH CAROLINA UNIV., CHAPEL HILL.
Public Policy Alternatives Affecting Water and Sewer Service in Urban Growth Areas.,
W74-02835 3D

ORTH CAROLINA UNIV., CHAPEL HILL. ENTER FOR URBAN AND REGIONAL TUDIES.
The Effects of Authorization for Water Impoundments on Shoreland Transition,
W74-02826 6B

ORTH CAROLINA UNIV., CHAPEL HILL. EPT. OF CITY AND REGIONAL PLANNING.
Preservation of Reservoir Sites,
W74-03123 6F

ORTH CAROLINA UNIV., CHAPEL HILL. EPT. OF ENVIRONMENTAL SCIENCES AND NGINEERING.
Planning for Water Resue,
W74-02845 5D

ORTH CAROLINA WATER RESOURCES ESEARCH INST., RALEIGH.
Highlights and Issues of the 1972 Amendments to the Federal Water Pollution Control Act,
W74-03180 6B

ORTH DAKOTA STATE UNIV., FARGO. OLL. OF ENGINEERING AND RCHITECTURE.
River: Recommendations for Improving the Valley Environmental Resources,
W74-02651 6B

River, Recommendations for Improving the Valley Environmental Resources, Administrative Report,
W74-02652 6B

NORTH DAKOTA STATE UNIV., FARGO. DEPT. OF BOTANY.
Vegetation of the Missouri River Floodplain in North Dakota,
W74-02667 2I

NORTH DAKOTA UNIV., GRAND FORKS. DEPT. OF BIOLOGY; AND NORTH DAKOTA UNIV., GRAND FORKS. DEPT. OF GEOLOGY.
The Biogeochemistry of Devils Lake, North Dakota,
W74-02664 5C

NORTH DAKOTA WATER RESOURCES RESEARCH INST., FARGO.
Implications of Selected National Water Commission Recommendations to Agricultural Policy,
W74-03181 6B

NORTH TEXAS STATE UNIV., DENTON. DEPT. OF CHEMISTRY; AND NORTH TEXAS STATE UNIV., DENTON. INST. FOR ENVIRONMENTAL STUDIES.
Analysis of Organic Materials in Wastewater Effluents After Chlorination,
W74-03081 5A

NORTHWESTERN UNIV., EVANSTON, ILL. TECHNOLOGICAL INST.
Design Optimization for Biological Filter Models,
W74-02679 5D

OAK RIDGE NATIONAL LAB., TENN.
Effect on Organisms of Entrainment in Cooling Water: Steps Toward Predictability,
W74-02894 5C

A Survey of the Biological-Science-Related Information Centers Listed in the Sequip Report,
W74-03041 10D

OCEAN SYSTEMS, INC., RESTON, VA.
Pacific Salmon Aquaculture Program--Incubation and Cultivation Phases,
W74-03028 2L

ODENSE UNIV. (DENMARK). BIOLOGICAL INST.
Observations on Upstream Migration by Imagines of Some Plecoptera and Ephemeroptera,
W74-02967 5B

OFFICE OF WATER RESOURCES RESEARCH, WASHINGTON, D.C.
Opportunities for Regional Coordination and Cooperation in Water Resources Research,
W74-03175 6B

OHIO STATE UNIV., COLUMBUS. DEPT. OF CHEMICAL ENGINEERING.
Factors Controlling Sludge Density During Acid Mine Drainage Neutralization,
W74-02827 5D

OHIO STATE UNIV., COLUMBUS. DEPT. OF MICROBIOLOGY.
Growth of an Adherent Mixed Microbial Culture in a Substrate Limited Single State Chemostat,
W74-02661 5C

Associated Organelles in the Blue-Green Alga, Anacystis Nidulans,
W74-02927 5C

OKLAHOMA UNIV. RESEARCH INST., NORMAN.
Development of a Prototype Search and Retrival Network for Water Resource Information,
W74-02821 10B

OMAHA PUBLIC POWER DISTRICT, NEB.
Nuclear Power Plant Heat Rejection in an Arid Climate,
W74-02887 5D

OREGON STATE UNIV., CORVALLIS. DEPT. OF MICROBIOLOGY.
Reversible Heat Injury in the Marine Psychrophilic Bacterium Vibrio marinus MP-1,
W74-02883 5C

Applicability of the Reverse-Flow Filter Technique to Marine Microbial Studies,
W74-02971 5A

OREGON STATE WATER RESOURCES BOARD, SALEM.
Oregon's Long-Range Requirements for Water.
W74-03119 6D

ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, PARIS (FRANCE). DEVELOPMENT CENTRE.
Wells and Welfare. An Exploratory Cost-Benefit Study of the Economics of Small-Scale Irrigation in Maharashtra,
W74-03192 6B

ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, PARIS (FRANCE). WATER MANAGEMENT SECTION GROUP.
Problems and Instruments Relating to the Allocation of Environmental Costs.
W74-03198 6B

OSSERVATORIO GEOFISICO SPERIMENTALE, TRIESTE (ITALY).
Dispersal Processes of Freshwaters in the Po River Coastal Area,
W74-02758 2E

OTAGO UNIV., DUNEDIN (NEW ZEALAND).MEDICAL SCHOOL.
Effects of Dieldrin on Brown Trout in Field and Laboratory Studies,
W74-02979 5C

OTTAWA UNIV. (ONTARIO).
Total Dissolved Electrolyte Effects on Periphyton,
W74-02990 5C

OTTAWA UNIV. (ONTARIO). DEPT. OF BIOLOGY.
Lipolytic Bacteria in the Ottawa River,
W74-02975 5A

OTTO DURR K.G., STUTTGART (WEST GERMANY). (ASSIGNEE).
Apparatus for Separating Paint or the Like from Water,
W74-03008 5D

OXFORD UNIV. (ENGLAND).
Economic and Social Purposes Related to Water Management,
W74-03197 6B

PASSAVANT-WERKE, MICHELBACH (WEST GERMANY). MICHELBACHERHUTTE. (ASSIGNEE)
Surface Aerator Having Wave Attenuator,
W74-03018 5D

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF VETERINARY SCIENCE.
Escherichia coli Serogroups Isolated from Streams in Pennsylvania, 1965 to 1972,
W74-02988 5A

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. INST. FOR RESEARCH ON LAND AND WATER RESOURCES.
Random Drilling for Water in Carbonate Rocks,
W74-03141 8B

PHILADELPHIA WATER DEPT., PA.
Industrial and High Velocity Metering,
W74-02858 5F

PHILLIPS PETROLEUM CO., BARTLESVILLE, OKLA.
The Effect of Thinners on the Fabric of Clay Muds and Gels,
W74-03159 8G

PLANTENZIEKTENKUNDE DIENST, WAGENINGEN (NETHERLANDS).
Some Aspects of Chemical Control of Soil-Borne Pathogens,
W74-02889 5B

POLITEKHNICHESKII INSTITUT, LENINGRAD (USSR).
Water Management in Finland (Vodnoye khozyaystvo Finlyandii),
W74-02754 6B

POLLUTION ABSTRACTS, INC., LA JOLLA, CALIF.
Technical and Scientific Journals,
W74-03045 10C

POLLUTION RESEARCH LAB., STEVENAGE (ENGLAND).
A Theoretical Study of Factors Influencing the Microbial Population Dynamics of the Activated-Sludge Process - I. The Effects of Diurnal Variations of Sewage and Carnivorous Ciliated Protozoa,
W74-02996 5D

POLYTECHNIC INST. OF BROOKLYN, N.Y.
A Statistical Approach to Dynamic Modeling and Control of Water Distribution Systems,
W74-02673 4A

PORTSMOUTH WATER DEPT., VA.
Forest Management on the Watershed,
W74-03129 4C

PRINCETON UNIV. N.J. DEPT. OF ASTRONOMICAL PHYSICS.
The Great Atlantic Coast Tides of 5-8 March 1962,
W74-03099 2J

PRINCETON UNIV., N.J. DEPT. OF CIVIL AND GEOLOGICAL ENGINEERING.
A Galerkin-Finite Element Simulation of Groundwater Contamination of Long Island, New York,
W74-02772 5B

QUEEN MARY COLL., LONDON (ENGLAND). DEPT. OF MECHANICAL ENGINEERING.
Free Convection Film Condensation of Steam in the Presence of Non-Condensing Gases,
W74-02896 8B

QUEENS COLL., FLUSHING, N.Y. DEPT. OF BIOLOGY.
Patterns of Radiocarbon Uptake by a Thermophilic Blue-Green Alga Under Varying Conditions of Incubation,
W74-02972 5C

RED JACKET MFG. CO., DAVENPORT, IOWA. (ASSIGNEE).
Iron Removal Filter System,
W74-03002 5F

RENSSELAER POLYTECHNIC INST., TROY, N.Y. DEPT. OF GEOLOGY.
Incorporation of Uranium in Modern Corals,
W74-03064 2K

RENTON CITY PLANNING DEPT., WASH.
Final Environmental Impact Statement for Modification of a Boat Dock and Ramp.
W74-03124 6G

RESOURCES FOR THE FUTURE, INC., WASHINGTON, D.C.
Comments on the Report of the National Water Commission,
W74-03174 6B

RHODE ISLAND UNIV., KINGSTON. GRADUATE SCHOOL OF OCEANOGRAPHY.
Partitioning of the Estuarine Environment by Two Species of Cancer,
W74-02717 2L

RHODES UNIV., GRAHAMSTOWN (SOUTH AFRICA). DEPT. OF ZOOLOGY AND ENTOMOLOGY.
Determination of the Heat Capacity of Lake Kariba,
W74-02910 2H

RICE UNIV., HOUSTON, TEX. DEPT. OF BIOLOGY; AND RICE UNIV., HOUSTON, TEX. DEPT. OF ENVIRONMENTAL SCIENCE AND ENGINEERING.
Physiology and Ultrastructure of an Oxygen-Resistant Chlorella Mutant Under Heterotrophic Conditions,
W74-02922 5C

RMBR PLANNING/DESIGN GROUP, TAMPA, FLA.
Clearwater Coastal Zone Management Plan.
W74-03116 2L

ROSTONE CORP., LAFAYETTE, IND. (ASSIGNEE).
Filter Bottom and Molded Module Therefor,
W74-03006 5D

RUHR-UNIVERSITAET BOCHUM (WEST GERMANY). INST. OF MINERALOGY.
Antidune and Chute and Pool Structures in the Base Surge Deposits of the Laacher See Area, Germany,
W74-03063 2J

RUMMEL, KLEPPER AND KOHL, BALTIMORE, MD.
Application of the Implicit Method to Surges in Open Channels,
W74-02767 2E

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF ENVIRONMENTAL SCIENCE.
Atmospheric Reaeration Capacity of Streams. Part I. Critical Review of Methods Available to Measure and to Calculate the Atmospheric Reaeration Rate Constant,
W74-02916 5C

Atmospheric Reaeration Capacity of Streams. Part II. Direct Measurement of the Atmospheric Reaeration Rate Constant in the Upper Raritan River Basin,
W74-02917 5C

RUTGERS - THE STATE UNIV. PRINCETON, N.J. WATER RESOURCES RESEARCH INST.
Institutional Problems in the Water Resources Field,
W74-03183 6B

SAINT LOUIS METROPOLITAN SEWER DISTRICT, MO.
Application and Operation of Sludge Incineration,
W74-02849 5E

A Method for Industrial Waste Control and Surcharge Assessment,
W74-02850 6C

SAN DIEGO CITY PLANNING DEPT., CALIF.
San Diego's Offshore Area,
W74-02831 6F

The Ocean Edge of San Diego,
W74-03120 6D

SASKATCHEWAN UNIV., SASKATOON. DIV. OF HYDROLOGY.
Hydrodynamics of Laminar Flow Over a Porous Bed,
W74-02770 2E

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
A Multi-Purpose Data Acquisition System for Instrumentation of the Nearshore Environment,
W74-02688 7B

Coastal Sand Dunes of Guerrero Negro, Baja California, Mexico,
W74-02704 2L

Crater-Sink Sand Transfer System,
W74-02705 8A

Longshore Transport of Sand,
W74-02706 2

Littoral Sedimentary Processes on Kauai, a Subtropical High Island,
W74-03102 2

SERVICE BUREAU CORP., NEW YORK.
Water Wave Run-Up on a Beach,
W74-02698 2E

SHELL OIL CO., HOUSTON, TEX.
The Role of Rock Strength Anisotropy in Natural Hole Deviation,
W74-03156 8E

SHELL OIL CO., LOS ANGELES, CALIF.
A Double-Electrode Method of Spontaneous Potential Logging,
W74-03170 8G

SHIGA UNIV., OTSU (JAPAN). FACULTY OF EDUCATION.
On the Water Quality of Lake Biwa, The Set River and some Rivers in Otsu City and th Heavy Metal Content of Bottom Matters o Lake Biwa, (In Japanese),
W74-02935 5I

SMITHSONIAN INSTITUTION, WASHINGTON D.C.
Evolution of the Law of the Seas--Destructio of the Pristine Nature of Basic Oceanographi Research,
W74-02791 6E

SOIL CONSERVATION RESEARCH INST., ANKARA (TURKEY). IRRIGATION AND DRAINAGE DIV.
Water Requirements of Various Crops in Arid and Semi-Arid Zones of Turkey,
W74-02937 3F

SPERRY RAND CORP., NEW YORK. (ASSIGNEE)
System for Surveillance of Ocean Dumping
W74-03021 5G

SRG PARTNERSHIP, PORTLAND, OREG.
Lower Willamette River Management Plan.
W74-03121 4A

STANFORD UNIV., CALIF.
Stimulation Modes of Geothermal Aquifers,
W74-02876 4B

STANFORD UNIV., CALIF. DEPT. OF CIVIL ENGINEERING.
An Investigation of the Deformation and Breaking of Solitary Waves,
W74-02694 2E

Implications of the National Water Commission Report for the Universities Council on Water Resources,
W74-03173 6B

STANFORD UNIV., CALIF. DEPT. OF GEOLOGY.
Computer Simulation of Shallow-Water Marine Sedimentation,
W74-03109 2J

STANFORD UNIV., PACIFIC GROVE, CALIF. HOPKINS MARINE STATION.
Respiration Rates of Some New Zealand Echinoderms (Note),
W74-02949 5A

STATE UNIV. OF NEW YORK, ALBANY. DEPT. OF BIOLOGICAL SCIENCES.
Two New Species of Caryophyllid Tapeworms from Catostomid Fishes in Tennessee,
W74-02995 2I

STEVENS, THOMPSON AND RUNYAN, INC., PORTLAND, OREG.
Water quality Management Plan for the Green and Cedar River Basins in the State of Washington: Progress Report for Fiscal Year Ending June 30, 1972.
W74-02842 5D

SUN OIL CO., PHILADELPHIA, PA.
Sun Treats Cooling Water Without Chromates for Corrosion Protection,
W74-03160 8G

SWEDISH WATER AND AIR POLLUTION RESEARCH LAB., STOCKHOLM.
Long-Term Stability of Waste Lignins in Aquatic Systems,
W74-03078 5B

SYDNEY UNIV. (AUSTRALIA). DEPT. OF PHYSICAL CHEMISTRY.
The Ionic Activity Function of Water and the Activity Coefficient of the Hydrogen Ion in Seawater,
W74-02760 1B

TATA INST. OF FUNDAMENTAL RESEARCH, BOMBAY (INDIA).
Geochronological Studies in Santa Barbara Basin: Fe-55 as a Unique Tracer for Particulate Settling,
W74-02722 2J

TECHNICAL UNIV. OF BUDAPEST (HUNGARY). INST. FOR GENERAL AND ANALYTICAL CHEMISTRY.
Enhancement of Sensitivity for Determination of Mercury in Waters,
W74-03080 5A

TENNESSEE UNIV., KNOXVILLE.
Water Pollution--The Tennessee Response; Conclusions and Generalizations,
W74-02794 6E

TENNESSEE UNIV., SPACE INST., TULLAHOMA.
MHD Central Power: A Status Report,
W74-02871 5B

TENNESSEE VALLEY AUTHORITY, CHATTANOOGA. DIV. OF ENVIRONMENTAL RESEARCH AND DEVELOPMENT.
Variation in Results of Identical Bioassays of Minnows Subjected to Instant Temperature Increase,
W74-02898 5C

Statistical Analysis of Biological Data from Preoperational-Postoperational Industrial Water Quality Monitoring,
W74-02993 5A

TEXACO, INC., NEW YORK. (ASSIGNEE).
Method and Apparatus for Determining a Fluid Contaminant,
W74-03000 5G

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF ANIMAL SCIENCE.
Chemical Characteristics, Bacterial Counts, and Potential Shelf-Life of Shrimp from Various Locations on the Northwestern Gulf of Mexico,
W74-02955 5A

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF INDUSTRIAL ENGINEERING.
Chance-Constrained Model of System of Reservoirs,
W74-02676 4A

TEXAS INSTRUMENTS INC., DALLAS.
Evaluation of the Ferric Ion Sensitive Chalcogenide Glass Electrode,
W74-02984 5A

THORNTHWAITE (C.W.) ASSOCIATES, ELMER, N.J. LAB. OF CLIMATOLOGY.
Coastal Storms of the Eastern United States,
W74-03098 2B

TOKYO UNIV. (JAPAN). GEOPHYSICAL INST.
Deformation of Temporal Pattern of Orbital Wave Velocity and Sediment Transport in Shoaling Water, In Breaker Zone and on Foreshore,
W74-02711 2L

TOKYO UNIV. (JAPAN). INST. OF APPLIED MICROBIOLOGY.
Effect of Copper and Hexavalent Chromium on the Specific Growth Rate of Ciliata Isolated from Activated-Sludge,
W74-02994 5C

TOKYO UNIV. OF EDUCATION (JAPAN).
Odonata of Sugadaira and Vicinity,
W74-02783 2I

TRIPPENSEE CORP., SAGINAW, MICH. (ASSIGNEE)
Benthic Dredge Construction,
W74-03022 8C

TULSA CITY--COUNTY HEALTH DEPT., OKLA.
The Identification and Measurement of Chlorinated Hydrocarbon Pesticides Accumulated From Urban Runoff,
W74-02665 5A

UNION CARBIDE CORP., TONAWANDA, N.Y. LINDE DIV.
The Activated Sludge Process using High-Purity Oxygen for Treating Kraft Mill Wastewater,
W74-03068 5D

UNIROYAL, INC., NEW YORK. (ASSIGNEE)
Apparatus,
W74-03014 5G

UNIVERSIDAD AUTONOMA DE NUEVO LEON, MONTERREY (MEXICO). FACULTY OF ECONOMICS.
The 200 Miles Fishing Rights Controversy: Ecology or High Tariffs,
W74-03200 6E

UNIVERSITE DE PARIS-SUD XI, SCEAUX (FRANCE). LAB. OF PLANT CELLULAR PHYSIOLOGY.
Red Light and Nitrogen Starvation Induced Changes in Pigment Composition (Phycoerythrin, Chlorophyll Forms) and Photosynthetic 02 Evolution of Porphyridium Sp. (Effets de la Lumiere Rouge et de la Carence en azote sur la composition pigmentaire (phycoerythrine, holochromes chlorophylliens) et l'emission d'02 photosynethetique de porphyridium sp).,
W74-02964 5C

UNIVERSITY COLL. OF SWANSEA (WALES). DEPT. OF BOTANY.
The Appearance of Nitrate Reductase Activity in Nitrogen-Starved Cells of Ankistrodesmus Braunii,
W74-02929 5C

UNIVERSITY OF EAST ANGLIA, NORWICH (ENGLAND). SCHOOL OF ENVIRONMENTAL SCIENCES.
Mud in the North Sea,
W74-03031 2J

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. DEPT. OF GEOLOGY.
Energy Measurements in the Swash-Surf Zone,
W74-02702 2E

The Effects of Water Table and Tide Cycle on Swash-Backwash Sediment Distribution and Beach Profile Development,
W74-02716 2J

UNIVERSITY OF STRATHCLYDE, GLASGOW (SCOTLAND). DEPT. OF APPLIED MICROBIOLOGY.
An Introduction to the Phytoplankton, Primary Production and Relevant Hydrography of Loch Etive,
W74-02991 5C

URS CORP., BURLINGAME, CALIF.
Wave Runup, Mono Lake Tests, 1965: A Summary of Theoretical Prediction Methods and Some Comparisons with Experimental Data,
W74-03113 2H

Calculation of a Solitary Wave Shoaling on a Shallow Slope,
W74-03115 8B

UTAH UNIV., SALT LAKE CITY. COLL. OF LAW.

UTAH UNIV., SALT LAKE CITY. COLL. OF LAW.
Legal Bibliography: A Critical Overview,
W74-03050 10C

UTAH WATER RESEARCH LAB., LOGAN.
Water Resources Policy Issues Related to Agriculture,
W74-03182 6B

UTTAR PRADESH IRRIGATION DEPT., LUCKNOW (INDIA).
Designing for Future Expansion-Development of Ground Water in India,
W74-03151 4B

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF BIOLOGY.
Rotenone Methods in a Large River System,
W74-02736 8I

Preliminary Report on Simulated Passage Effect of Potential Colonizing Protozoans Through Condenser of a Steam Electric Power Generating Plant Upon Downstream Protozoan Community Development,
W74-02930 5C

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF FISHERIES AND WILDLIFE SCIENCES.
Bottom Fauna Changes During Artificial Reservoir Destratification,
W74-02992 5C

VTN NEVADA, LAS VEGAS; AND JONES AND STOKES ASSOCIATES, INC., LAS VEGAS, NEV.
Environmental Assessment; Pollution Abatement Project, Las Vegas Wash and Bay, Annex B.
W74-03118 5D

WALLOVER OIL CO., EAST LIVERPOOL, OHIO. (ASSIGNEE).
Continuously Regenerating Active Earth Filtering Apparatus for Liquid wastes,
W74-03004 5D

WASHINGTON STATE UNIV., PULLMAN. DEPT. OF ZOOLOGY.
The Effect of Photoperiod on Thermal Resistance of Speckled Dace,
W74-02902 5C

WASHINGTON UNIV., SEATTLE. DEPT. OF CIVIL ENGINEERING.
Incorporation of Glide and Creep Measurements Into Snow Slab Mechanics,
W74-02742 2C

WASHINGTON UNIV., SEATTLE. DEPT. OF ECONOMICS.
Economic and Political Objectives in Fishery Management,
W74-03195 6B

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
Processes contributing to the Nutrient Distributions off the Columbia River and Strait of Juan de Fuca,
W74-03101 5B

WASHINGTON UNIV., SEATTLE. DIV. OF MARINE RESOURCES.
Checklist of Puget Sound Fishes,
W74-03060 2L

WATER RESOURCE RESEARCH CENTER.
Feasibility Study: Hydraulic Fracturing of Drilled Water Wells to Stimulate Their Yield,
W74-02659 8B

WATERMASTER INDUSTRIES LTD., LONDON (ONTARIO). (ASSIGNEE).
Floating Skimmer,
W74-03005 5G

WESTINGHOUSE RESEARCH LAB., PITTSBURGH, PA.
Power Plant Effluent - Thermal Pollution or Energy at a Bargain Price,
W74-02888 5B

WISCONSIN UNIV. CENTER, MARINETTE.
Investigation of a Northeastern Wisconsin Lake Ecosystem: An Interdisciplinary Approach. Phase II-Management Problems and Alternatives,
W74-02662 6B

WISCONSIN UNIV., MADISON. DEPT. OF SOIL SCIENCE.
Nitrogen Fixation in Lake Sediments: A Contribution to Nitrogen Budget of Lake Mendota,
W74-02924 5C

WISCONSIN UNIV., MADISON. INLAND LAKE DEMONSTRATION PROJECT.
A State/Local Lake Rehabilitation Program: A Proposed Bill and Commentary,
W74-03196 5G

WISCONSIN UNIV., MILWAUKEE. DEPT. OF GEOLOGICAL SCIENCES.
Minimization of Power Expenditure in a Riffle-Pool Alluvial Channel,
W74-02768 2J

WISCONSIN UNIV., WASUSAU. UNIV. EXTENSION.
Lower Wisconsin River Valley Soil Resources and Use Potentials,
W74-02957 4A

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Surface Circulation of Lakes and Nearly Land-Locked Seas,
W74-02715 2H

WORCESTER POLYTECHNIC INST., MASS. ALDEN RESEARCH LABS.
Chesapeake Bay Model Study for Calvert Cliffs,
W74-02905 5B

WYOMING UNIV., LARAMIE. DEPT. OF CIVIL ENGINEERING.
Parametric Determination of Minimum Streamflow for Trout,
W74-02670 8I

WYOMING UNIV., LARAMIE. DIV. OF PLANT SCIENCE.
Vegetative Response to Chemical Control of Broom Snakeweed on a Blue Grama Range,
W74-02943 4A

WYZSZA SZKOLA ROLNICZA, OLSZTYN-KORTOWO (POLAND).I. INSTYTUT INZYNIERII I BIOTECHNOLOGII ZYWNOSCI.
The Occurrence of Heterotrophic Bacteria in the Waters of the Ilawa Lakes and Some of Their Physiological and Biochemical Properties,
W74-02931 5C

YALE UNIV., NEW HAVEN, CONN. DEPT. OF BIOLOGY.
Calefaction of the Connecticut River, U.S.A.,
W74-02864 5B

ACCESSION NUMBER INDEX

W74-02651 6B
W74-02652 6B
W74-02653 2C
W74-02654 6B
W74-02655 5D
W74-02656 2I
W74-02657 6B
W74-02658 5A
W74-02659 8B
W74-02660 6B
W74-02661 5C
W74-02662 6B
W74-02663 5C
W74-02664 5C
W74-02665 5A
W74-02666 4D
W74-02667 2I
W74-02668 5D
W74-02669 2G
W74-02670 8I
W74-02671 6B
W74-02672 5C
W74-02673 4A
W74-02674 4A
W74-02675 5B
W74-02676 4A
W74-02677 5B
W74-02678 5B
W74-02679 5D
W74-02680 3F
W74-02681 5D
W74-02682 4A
W74-02683 5B
W74-02684 6A
W74-02685 5C
W74-02686 6B
W74-02687 6B
W74-02688 7B
W74-02689 2J
W74-02690 5C
W74-02691 2L
W74-02692 2L
W74-02693 2J
W74-02694 2E
W74-02695 2L
W74-02696 5C
W74-02697 2E
W74-02698 2E
W74-02699 5C
W74-02700 2L
W74-02701 2L
W74-02702 2E
W74-02703 2L
W74-02704 2L
W74-02705 8A
W74-02706 2J
W74-02707 2L
W74-02708 2L
W74-02709 2E
W74-02710 2L
W74-02711 2L
W74-02712 2E
W74-02713 2E
W74-02714 2J
W74-02715 2H
W74-02716 2J
W74-02717 2L
W74-02718 8B
W74-02719 2I
W74-02720 2J
W74-02721 5B
W74-02722 2J
W74-02723 5D
W74-02724 7C
W74-02725 5A
W74-02726 2H
W74-02727 2H
W74-02728 2H
W74-02729 2H
W74-02730 2K
W74-02731 5A
W74-02732 5B
W74-02733 5B
W74-02734 4B
W74-02735 5B
W74-02736 8I
W74-02737 6G
W74-02738 2C
W74-02739 5A
W74-02740 2C
W74-02741 2C
W74-02742 2C
W74-02743 2C
W74-02744 2C
W74-02745 2C
W74-02746 2C
W74-02747 2C
W74-02748 6B
W74-02749 5D
W74-02750 2J
W74-02751 2E
W74-02752 2E
W74-02753 2E
W74-02754 6B
W74-02755 2H
W74-02756 2E
W74-02757 6B
W74-02758 2E
W74-02759 2K
W74-02760 1B
W74-02761 2K
W74-02762 2H
W74-02763 2E
W74-02764 2D
W74-02765 2I
W74-02766 2D
W74-02767 2E
W74-02768 2J
W74-02769 2J
W74-02770 2E
W74-02771 2D
W74-02772 5B
W74-02773 2F
W74-02774 3B
W74-02775 2E
W74-02776 2F
W74-02777 6G
W74-02778 6G
W74-02779 6E
W74-02780 6E
W74-02781 4A
W74-02782 6E
W74-02783 2I
W74-02784 6E
W74-02785 6E
W74-02786 6E
W74-02787 6E
W74-02788 6E
W74-02789 6E
W74-02790 6E
W74-02791 6E
W74-02792 6E
W74-02793 6E
W74-02794 6E
W74-02795 6E
W74-02796 6E
W74-02797 6E
W74-02798 5A
W74-02799 6E
W74-02800 8A
W74-02801 5D
W74-02802 6E
W74-02803 6E
W74-02804 6E
W74-02805 6E
W74-02806 6E
W74-02807 6E
W74-02808 6E
W74-02809 6E
W74-02810 6E
W74-02811 6E
W74-02812 6E
W74-02813 6E
W74-02814 6E
W74-02815 6E
W74-02816 6E
W74-02817 6E
W74-02818 6E
W74-02819 6E
W74-02820 2H
W74-02821 10B
W74-02822 6B
W74-02823 5B
W74-02824 5B
W74-02825 5A
W74-02826 6B
W74-02827 5D
W74-02828 2E
W74-02829 4A
W74-02830 5D
W74-02831 6F
W74-02832 5D
W74-02833 5D
W74-02834 5D
W74-02835 3D
W74-02836 3D
W74-02837 6B
W74-02838 6D
W74-02839 6C
W74-02840 5D
W74-02841 5G
W74-02842 5D
W74-02843 6B
W74-02844 6B
W74-02845 5D
W74-02846 5D
W74-02847 4B
W74-02848 5D
W74-02849 5E
W74-02850 6C
W74-02851 5D
W74-02852 5G
W74-02853 8A
W74-02854 5F
W74-02855 8A
W74-02856 5G
W74-02857 2E
W74-02858 5F
W74-02859 6F
W74-02860 6A
W74-02861 6E
W74-02862 6E
W74-02863 5C
W74-02864 5B
W74-02865 5C
W74-02866 2I
W74-02867 5C
W74-02868 5C
W74-02869 5B
W74-02870 5C
W74-02871 5B
W74-02872 5C
W74-02873 5C
W74-02874 2K
W74-02875 5G
W74-02876 4B
W74-02877 2G
W74-02878 5C
W74-02879 5C
W74-02880 8B
W74-02881 5C
W74-02882 8G
W74-02883 5C
W74-02884 8B
W74-02885 2K
W74-02886 5C
W74-02887 5D
W74-02888 5B
W74-02889 5B
W74-02890 5G
W74-02891 2B
W74-02892 5B
W74-02893 2H
W74-02894 5C
W74-02895 5B
W74-02896 8B
W74-02897 8B
W74-02898 5C
W74-02899 5C
W74-02900 5C
W74-02901 2H
W74-02902 5C
W74-02903 2K
W74-02904 8B
W74-02905 5B
W74-02906 5D
W74-02907 5C
W74-02908 2D
W74-02909 2A
W74-02910 2H
W74-02911 8C
W74-02912 3B
W74-02913 2B
W74-02914 2H
W74-02915 3B
W74-02916 5C
W74-02917 5C
W74-02918 4A
W74-02919 4A
W74-02920 5C
W74-02921 3F
W74-02922 5C
W74-02923 5C
W74-02924 5C
W74-02925 5C
W74-02926 5C
W74-02927 5C
W74-02928 5C
W74-02929 5C
W74-02930 5C
W74-02931 5C
W74-02932 5A
W74-02933 2H
W74-02934 5C
W74-02935 5B
W74-02936 3F
W74-02937 3F
W74-02938 4A
W74-02939 3F
W74-02940 2D
W74-02941 3F
W74-02942 3F
W74-02943 4A
W74-02944 4A
W74-02945 4A
W74-02946 5G
W74-02947 5G
W74-02948 5B
W74-02949 5A
W74-02950 7C
W74-02951 5C
W74-02952 5C
W74-02953 5A
W74-02954 5B
W74-02955 5A
W74-02956 5C
W74-02957 4A
W74-02958 5B
W74-02959 5C
W74-02960 5C
W74-02961 5C
W74-02962 5C

W74-02963 5C
W74-02964 5C
W74-02965 5C
W74-02966 5B
W74-02967 5B
W74-02968 5A
W74-02969 7C
W74-02970 5C
W74-02971 5A
W74-02972 5C
W74-02973 5A
W74-02974 5A
W74-02975 5A
W74-02976 5A
W74-02977 2K
W74-02978 2K
W74-02979 5C
W74-02980 7C
W74-02981 7B
W74-02982 7C
W74-02983 7C
W74-02984 5A
W74-02985 5C
W74-02986 5A
W74-02987 5A
W74-02988 5A
W74-02989 5A
W74-02990 5C
W74-02991 5C
W74-02992 5C
W74-02993 5A
W74-02994 5C
W74-02995 2I
W74-02996 5D
W74-02997 5C
W74-02998 5C
W74-02999 5D
W74-03000 5G
W74-03001 5D
W74-03002 5F
W74-03003 5D
W74-03004 5D
W74-03005 5G
W74-03006 5D
W74-03007 5G
W74-03008 5D
W74-03009 3A
W74-03010 3A
W74-03011 3A
W74-03012 5D
W74-03013 8C
W74-03014 5G
W74-03015 5G
W74-03016 5D
W74-03017 5G
W74-03018 5D
W74-03019 5D
W74-03020 5D
W74-03021 5G
W74-03022 8C
W74-03023 5G
W74-03024 2A
W74-03025 2H
W74-03026 4A
W74-03027 5G
W74-03028 2L
W74-03029 2E
W74-03030 5B
W74-03031 2J
W74-03032 2J
W74-03033 5B
W74-03034 5B
W74-03035 7C
W74-03036 8I
W74-03037 5G
W74-03038 4A
W74-03039 5D
W74-03040 10B
W74-03041 10D
W74-03042 10D
W74-03043 10D
W74-03044 10A
W74-03045 10C
W74-03046 10C
W74-03047 10B
W74-03048 10B
W74-03049 10B
W74-03050 10C
W74-03051 10B
W74-03052 10B
W74-03053 10B
W74-03054 2L
W74-03055 2L
W74-03056 3B
W74-03057 5B
W74-03058 2I
W74-03059 2L
W74-03060 2L
W74-03061 2L
W74-03062 2K
W74-03063 2J
W74-03064 2K
W74-03065 2J
W74-03066 2H
W74-03067 2C
W74-03068 5D
W74-03069 5A
W74-03070 5D
W74-03071 5D
W74-03072 5D
W74-03073 5D
W74-03074 5C
W74-03075 5C
W74-03076 2G
W74-03077 5D
W74-03078 5B
W74-03079 5A
W74-03080 5A
W74-03081 5A
W74-03082 5D
W74-03083 4A
W74-03084 5D
W74-03085 5B
W74-03086 5C
W74-03087 5D
W74-03088 5D
W74-03089 5D
W74-03090 2H
W74-03091 4B
W74-03092 5G
W74-03093 5B
W74-03094 2L
W74-03095 5D
W74-03096 2J
W74-03097 2I
W74-03098 2B
W74-03099 2J
W74-03100 2L
W74-03101 5B
W74-03102 2J
W74-03103 2E
W74-03104 2J
W74-03105 2J
W74-03106 8B
W74-03107 2H
W74-03108 2J
W74-03109 2J
W74-03110 2J
W74-03111 2J
W74-03112 2J
W74-03113 2H
W74-03114 2L
W74-03115 8B
W74-03116 2L
W74-03117 6D
W74-03118 5D
W74-03119 6D
W74-03120 6D
W74-03121 4A
W74-03122 3D
W74-03123 6F
W74-03124 6G
W74-03125 4A
W74-03126 7B
W74-03127 6E
W74-03128 5D
W74-03129 4C
W74-03130 8A
W74-03131 5G
W74-03132 6E
W74-03133 6G
W74-03134 6E
W74-03135 6E
W74-03136 5A
W74-03137 2B
W74-03138 2A
W74-03139 1B
W74-03140 1B
W74-03141 8B
W74-03142 4B
W74-03143 8A
W74-03144 8B
W74-03145 8E
W74-03146 8B
W74-03147 8C
W74-03148 8E
W74-03149 8B
W74-03150 4B
W74-03151 4B
W74-03152 6B
W74-03153 2F
W74-03154 8B
W74-03155 2F
W74-03156 8B
W74-03157 8B
W74-03158 5G
W74-03159 8G
W74-03160 8G
W74-03161 4B
W74-03162 8G
W74-03163 4B
W74-03164 2F
W74-03165 8E
W74-03166 8G
W74-03167 8B
W74-03168 8B
W74-03169 8F
W74-03170 8G
W74-03171 5A
W74-03172 6B
W74-03173 6B
W74-03174 6B
W74-03175 6B
W74-03176 6B
W74-03177 6B
W74-03178 6B
W74-03179 6B
W74-03180 6B
W74-03181 6B
W74-03182 6B
W74-03183 6B
W74-03184 6B
W74-03185 5A
W74-03186 2G
W74-03187 5D
W74-03188 6B
W74-03189 5G
W74-03190 6B
W74-03191 4B
W74-03192 6B
W74-03193 6A
W74-03194 5D
W74-03195 6B
W74-03196 5G
W74-03197 6B
W74-03198 6B
W74-03199 6B
W74-03200 6E

Source	Accession Number	Total
A. Centers of Competence		
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W74-02948 -- 02956 02958 -- 02994 02996 -- 02998	49
Cornell University, Policy Models for Water Resources Systems	W74-02673 -- 02684	12
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W74-03067 -- 03082 03084 -- 03089	22
National Water Well Association, Water Well Construction Technology	W74-03141 -- 03170	30
University of Arizona, Arid Land Water Resources	W74-02936 -- 02945	10
University of Florida, Eastern U. S. Water Law	W74-02777 -- 02782 02784 -- 02797 02799 -- 02819 03130 -- 03136	48
University of North Carolina, Metropolitan Water Resources Planning and Management	W74-02829 -- 02847 03116 -- 03125 03127 -- 03129	32
University of Wisconsin, Eutrophication	W74-02663 -- 02664 02916 -- 02920 02922 -- 02929 02931, 02934	17
University of Wisconsin, Water Resources Economics	W74-02685 -- 02687 03187 -- 03200	17
U. S. Geological Survey, Hydrology	W74-02665 -- 02670 02722 -- 02724 02726 -- 02776 02828 03026 -- 03065 03091 -- 03095 03171 -- 03184	120
Vanderbilt University, Thermal Pollution	W74-02863 -- 02865 02867 -- 02876 02878 -- 02888 02890 -- 02892 02894 -- 02900 02902 02904 -- 02905	37
B. State Water Resources Research Institutes		
Arizona Water Resources Research Center	W74-03137 -- 03138	2
Delaware Water Resources Center	W74-02654 -- 02655	2
Georgia Environmental Resources Center	W74-03139 -- 03140	2
Idaho Water Resources Research Institute	W74-02656	1
Kansas Water Resources Research Institute	W74-02823 -- 02824	2
Louisiana Water Resources Research Institute	W74-02825	1
Massachusetts Water Resources Research Center	W74-02657, 02671	2

Source	Accession Number	Total
B. State Water Resources Research Institutes (Cont'd)		
Missouri Water Resources Research Center	W74-02658	1
New Hampshire Water Resources Research Center	W74-02659	1
New Mexico Water Resources Research Institute	W74-02660	1
North Carolina Water Resources Research Institute	W74-02826	1
Ohio Water Resources Center	W74-02661 02827	2
Wisconsin Water Resources Center	W74-02662	1
C. Other		
BioSciences Information Service	W74-02672, 02690 02696, 02699 02719, 02725 02783, 02798 02820, 02866 02877, 02889 02893, 02901 02903, 02921 02930 02932 -- 02933 02935, 02957 02995, 03025 03066, 03083 03090, 03097 03126 03185 -- 03186	30
Department of Water Affairs	W74-02906 -- 02915	10
Engineering Aspects of Urban Water Resources (Poertner)	W74-02848 -- 02862	15
Environmental Protection Agency	W74-02946 -- 02947	2
Ocean Engineering Information Service	W74-02688 -- 02689 02691 -- 02695 02697 -- 02698 02700 -- 02718 02720 -- 02721 03096 03098 -- 03115	49
Ocean Engineering Information Service (Patents)	W74-02999 -- 03023	25
Office of Water Resources Research	W74-02651 -- 02653 02821 -- 02822	5

★ U. S. GOVERNMENT PRINTING OFFICE : 1974 542-956/19

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

7 RESOURCES DATA

8 ENGINEERING WORKS

9 MANPOWER, GRANTS, AND FACILITIES

0 SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
Springfield, Va. 22151

OFFICIAL BUSINESS

PRINTED MATTER

U.S.MAIL

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

AN EQUAL OPPORTUNITY EMPLOYER

JOHN LITTLEWOOD
DOCUMENTS DIVISION
220-D LIBRARY

016.33391
Se48

THE LIBRARY OF THE
6 1974
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 7
APRIL 1, 1974

W74-03201 -- W74-03750

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

SELECTED WATER RESOURCES ABSTRACTS is available to Federal agencies, contractors, or grantees in water resources upon request to: Manager, Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior, Washington, D. C. 20240.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from the National Technical Information Service. Annual subscription is $45 (domestic), $56.25 (foreign). Certain documents abstracted in this journal can be purchased from the NTIS at prices indicated in the entry. Prepayment is required.

SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 7, NUMBER 7
APRIL 1, 1974

W74-03201 -- W74-03750

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1A. Properties

HYDROGEN-BOND PATTERNS IN LIQUID WATER,
Argonne National Lab., Ill.
A. Rahman, and F. H. Stillinger.
Journal of the American Chemical Society, Vol 95, No 24, p 7943-7948, November 28, 1973. 7 fig, 2 tab, 19 ref.

Descriptors: *Water properties, *Water structure, *Hydrogen bonding, *Molecular structure, *Crystallography, *Water chemistry, Hydrates, Ice, Simulation analysis, Thermodynamics, Crystals.

Theoretical distributions of non-short-circuited hydrogen-bond polygons between water molecules have been constructed, using a set of 14 configurations generated by a molecular dynamics simulation for liquid water. The thermodynamic state analyzed has a temperature of 10 C and a mass density of 1 g/cu cm. The distributions are broad and show nontrivial contributions from polygons with sizes greater than 8. These results seem to be inconsistent with the view of liquid water as a recognizable disrupted version of any known ice or hydrate crystal structure. (Brown-IPC)
W74-03539

1B. Aqueous Solutions and Suspensions

COMPARISON OF FIELD AND SIGMA-INDUCTIVE MODELS FOR THE TRANSMISSION OF NONCONJUGATIVE SUBSTITUENT EFFECTS. THE 2,6-SPIRO (3,3) HEPTYL SYSTEM,
Georgia Inst. of Tech. Atlanta. School of Chemistry.
For primary bibliographic entry see Field 02K.
W74-03737

THERMODYNAMICS OF ACID-BASE EQUILIBRIA. M' AND P' HYDROXYBENZALDEHYDE,
Georgia Inst. of Tech. Atlanta. School of Chemistry.
For primary bibliographic entry see Field 02K.
W74-03738

ANOMALOUS HEAT CAPACITIES OF SUPERCOOLED WATER AND HEAVY WATER,
Cryobiology Research Inst. Madison, Wis.
D. H. Rasmussen, A. P. MacKenzie, C. A. Angell, and J. C. Tucker.
Science, Vol. 181, p 342-344, 1973, 1 fig, 1 tab, 13 ref. OWRR B-051-IND (2).

Descriptors: *Supercooling, *Water structure, *Thermal capacity, *Emulsion, *Nucleation, *Heavy water, Water chemistry, Water properties, Heat capacity, Temperature, Rainfall nuclei, Crystallization, Deuterium.
Identifiers: Calarimetric, Proton Magnetic Resonance, Dilatometric.

Emulsification makes it possible to supercool water to the homogeneous nucleation temperature. Accordingly, the heat capacities of water and deuterium oxide have been determined from the respective equilibrium melting points to -38 and to -34C, respectively. Two methods, drift calorimetry and differential scanning calorimetry, have been used. Both methods reveal a striking rise in the constant-pressure heat capacity below -20C. This indication of an apparently cooperative behavior should serve to test current theories of water, most notably perhaps, the pair potential model of Ben-Naim and Stillinger. Some implications of possible meteorological significance are mentioned.
W74-03740

GLASS TRANSITION WITH NEGATIVE CHANGE IN EXPANSION COEFFICIENT,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
E. Williams, and C. A. Angell.
Journal of Polymer Chemistry, Polymer Letters Edition, Vol 11, p 383-387, 1973. 2 fig, 16 ref. OWRR B-051-IND (3).

Descriptors: *Aqueous solutions, *Polymers, *Physical properties, *Thermal properties, *Thermal expansion, Enthalpy, Entropy, Thermodynamic behavior, Thermal capacity, Heat capacity, Differential thermal analysis.
Identifiers: *Coefficient of expansion, Glass transition temperature, Configuration excitation, Differential scanning calorimetry.

The factor which controls viscous flow in liquid polymers and polymer solutions is the unoccupied or 'free' volume within the liquid structure. This quantity can be assessed through an empirical relationship from a knowledge of the change in the expansion coefficient at the glass transition temperature and the temperature interval from the transition point to the temperature of interest. However, accurate indirect evidence, and less accurate but supporting evidence is presented showing that for a lithium acetate water system a negative value for the difference between the expansion coefficients of the liquid and the glass transition temperature exists. These findings provide strong evidence for entropy, enthalpy, or configuration excitation theories over free volume theories. Volume theories work as well as they do for polymeric liquids and many small molecule van der Waals liquids, only because for these cases liquid volume is closely correlated with enthalpy. (Wiersma-Indiana)
W74-03741

02. WATER CYCLE

2A. General

FIFTH ALL-UNION SYMPOSIUM ON GLACIOLOGY (O PYATOM OBSHCHESOYUZNOM GLYATSIOLOGICHESKOM SIMPOZIUME),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 02C.
W74-03260

LIMESTONE SPRINGS AND INDIVIDUAL FLOOD EVENTS, (WITH SPECIAL REFERENCE TO THE GOWER PENINSULA, WALES),
University Coll. of Swansea (Wales). Dept. of Geography.
For primary bibliographic entry see Field 02F.
W74-03512

THE WATER CYCLE ON A WATERSHED IN THE PALOUSE REGION OF IDAHO,
Bureau of Reclamation, Fresno, Calif.
For primary bibliographic entry see Field 04A.
W74-03739

2B. Precipitation

SOME DATA ON FLUORINE, BROMINE, AND IODINE CONCENTRATIONS IN ATMOSPHERIC PRECIPITATION AT VORONEZH (NEKOTORYYE DANNYYE O SODERZHANII FTORA, BROMA I IODA V ATMOSFERNYKH OSADKAKH G. VORONEZHA),
Voronezhskii Lesotekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 05A.
W74-03251

STATISTICAL PREDICTION OF EQUILIBRIUM TEMPERATURE FROM STANDARD METEOROLOGICAL DATA BASES,
ESL, Inc., Sunnyvale, Calif.
For primary bibliographic entry see Field 05A.
W74-03330

DESIGN OF OPTIMAL PRECIPITATION NETWORKS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
W. M. Grayman, and P. S. Eagleson.
Available from the National Technical Information Service as PB-227 221, $4.75 in paper copy, $1.45 in microfiche. Report No. 168, 1973. 124 p, 28 fig, 5 tab, 25 ref, 3 append. OWRR C-2137 (No 3403) (6).

Descriptors: Precipitation (Atmospheric), Rain gages, Precipitation gages, Depth-area-duration analysis, *Simulated rainfall, *Network design, Model studies, Radar, *Warning systems, *Optimization, Costs, Benefits, Simulation analysis, Measurement, Income.
Identifiers: *Precipitation network, Susquehanna River.

The design of a precipitation measuring network based on the cost of the network and the benefits derived from the measurements is demonstrated. A single objective, maximize net national income and a single purpose use of the measurements in a flood warning system form the basis for the analysis. Two models are developed to determine the net benefits resulting from a particular network design. One model is a simulation model in which a trace of floods is generated, the error in flood prediction as a result of precipitation measurements is simulated and the net benefits are calculated. A second model is based on the convolution of probability distributions to determine the expected value of net benefits. A case study is performed in which the expected value model is utilized to determine the optimal precipitation measuring system for a river basin based on data representing the West Branch of the Susquehanna River. This study indicates the importance of considering network accuracy in the design of the network and in determination of the feasibility of a flood warning system. (Schaake-MIT)
W74-03333

A MULTISPECTRAL STUDY OF AN EXTRATROPICAL CYCLONE WITH NIMBUS 3 MEDIUM RESOLUTION INFRARED RADIOMETER DATA,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
R. Holub, and W. E. Shenk.
Available from NTIS, Springfield, Va 22151, NASA TN D-7184, Price $3.00 printed copy ($6.00 foreign) $1.45 microfiche. National Aeronautics and Space Administration Technical Note D-7184, November 1973. 71 p, 23 fig, 1 tab, 30 ref, append.

Descriptors: *Remote sensing, *Cyclones, *Weather patterns, *Infrared radiation, *Meterological data, Analytical techniques, Storms, Mapping, Tracking techniques, Cloud physics, Correlation analysis, Data collections, Aircraft, Ships, Satellites (Artificial).
Identifiers: Extratropical cyclones, Satellite radiation data, Cloud-type identification.

Four registered channels (0.2 to 4, 6.5 to 7, 10 to 11, and 20 to 23 micrometers) of the Nimbus 3 Medium Resolution Infrared Radiometer (MRIR) were used to study 24-hr changes in the structure of an extratropical cycline during a 6-day period in May 1969. Use of a stereographic-horizon map projection insured that the storm was mapped with a single perspective throughout the series and allowed the convenient preparation of 24-hr difference maps of the infrared radiation fields. Single-channel and multispectral analysis techniques were employed to establish the positions and vertical slopes of jetstreams, large cloud systems, and major features of middle and upper tropospheric circulation. Use of these techniques plus the difference maps and continuity of observation allowed the early detection of secondary cyclones developing within the circulation of the primary cyclone. An automated, multispectral cloud-type identification technique was developed, and comparisons that were made with conventional ship reports and with high-resolution visual data from the image dissector camera system (IDCS) showed good agreement. (Woodard-USGS)
W74-03349

A STUDY OF BIOTROPISM OF CLIMATE IN TWO CANADIAN CITIES,
Meteorological Office, Poona (India).
For primary bibliographic entry see Field 05C.
W74-03478

THE METEOROLOGICAL EFFECTS ON MICROWAVE APPARENT TEMPERATURES LOOKING DOWNWARD OVER A SMOOTH SEA,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 07B.
W74-03511

INVESTIGATION OF THE CHEMICAL COMPOSITION OF ATMOSPHERIC PRECIPITATION IN THE VICINITY OF YEVPATORIYA (ISSLEDOVANIYE KHIMICHESKOGO SOSTAVA ATMOSFERNYKH OSADKOV V RAYONE G. YEVPATORII),
For primary bibliographic entry see Field 02K.
W74-03526

2C. Snow, Ice, and Frost

FIFTH ALL-UNION SYMPOSIUM ON GLACIOLOGY (O PYATOM OBSHCHESOYUZNOM GLYATSIOLOGICHESKOM SIMPOZIUME),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
G. A. Avsyuk, and V. M. Kotlyakov.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 3, p 147-148, May-June 1973.

Descriptors: *Conferences, *Glaciology, Glaciation, Glaciers, Mountains, *Ice, *Snowpacks, Avalanches, Movement, Runoff, Water balance, Heat balance, Antarctic, Satellites (Artificial).
Identifiers: USSR, Paleoglaciology, Ice lenses, Tectonics.

Organized by the Interdepartmental Committee on Geophysics and by the Central Asian Regional Hydrometeorological Institute of the Main Administration of the Hydrometeorological Service, the Fifth All-Union Symposium on Glaciology was held in Tashkent, September 25-October 8, 1972. Participants included about 225 scientists from the Academy of Sciences of the USSR and Union Republics, institutes of the Hydrometeorological Service, and a number of universities and planning and industrial organizations. The 114 papers presented at 8 plenary and 14 working sessions were grouped under 9 subject headings: complex investigations of glaciers and glacierized areas (21 papers); glaciohydroclimatology and glacier runoff (19 papers); movement and tectonic structure of glaciers (8 papers); physical methods of investigation (7 papers); glaciology of the Antarctic (6 papers); paleoglaciology (15 papers); seasonal snow cover (11 papers); snow avalanches (20 papers); and ice lenses, sea ice, and river ice (7 papers). Results of investigations of ice, water, and heat balances in glacier basins of the Altay, Caucasus, Tien Shan, Pamir, and Alay Mountains were summarized, and consideration was given to possibilities of using artificial earth satellites to study snow-glacier complexes in mountains. Proceedings of the Fifth Symposium will be published in Transactions of the Central Asian Regional Hydrometeorological Institute and in the collections 'Data of Glaciological Studies; Chronicle and Discussions,' to be published by the USSR Academy of Science's Institute of Geography (Nos. 21-23). The Sixth All-Union Symposium on Glaciology is scheduled to be held in Alma-Ata in September 1976. (Josefson-USGS)
W74-03260

SOME ARCTIC LIMNOLOGY AND THE HIBERNATION OF INVERTEBRATES AND SOME FISHES IN SUB-ZERO TEMPERATURES,
Naturhistoriska Riksmuseet, Stockholm (Sweden). Section for Invertebrate Zoology.
For primary bibliographic entry see Field 02H.
W74-03275

MINERALIZATION AND IONIC COMPOSITION OF ICE IN SOME WATER BODIES OF THE NORTHERN CAUCASUS (O REZHIME MINERALIZATSII I IONNOGO SOSTAVA L'DA NEKOTORYKH VODOYEMOV SEVERNOGO KAVKAZA),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
For primary bibliographic entry see Field 02K.
W74-03529

2D. Evaporation and Transpiration

STATISTICAL PREDICTION OF EQUILIBRIUM TEMPERATURE FROM STANDARD METEOROLOGICAL DATA BASES,
ESL, Inc., Sunnyvale, Calif.
For primary bibliographic entry see Field 05A.
W74-03330

USE OF FINITE-DIFFERENCE ARRAYS OF OBSERVATION WELLS TO ESTIMATE EVAPOTRANSPIRATION FROM GROUND WATER IN THE ARKANSAS RIVER VALLEY, COLORADO,
Geological Survey, Washington, D.C.
E. P. Weeks, and M. L. Sorey.
Water-Supply Paper 2029-C, 1973. 27 p, 8 fig, 3 tab, 13 ref.

Descriptors: *Evapotranspiration, *Ground water, *Flood plains, *Colorado, Observation wells, Data collections, Methodology, Regression analysis, Vegetation, Growth rates, Correlation analysis, Water level fluctuations, Forecasting, Evaluation.
Identifiers: *Arkansas River Valley (Colo.).

A method to determine evapotranspiration from ground water was tested at four sites in the flood plain of the Arkansas River in Colorado. Approximate ground water budgets were obtained by analyzing water-level data from observation wells installed in five-point arrays. The analyses were based on finite-difference approximations of the differential equation describing ground water flow. Data from the sites were divided into two groups by season. It was assumed that water levels during the dormant season were unaffected by evapotranpsiration of ground water or by recharge, collectively termed 'accretion.' Regression analyses of these data were made to provide an equation for separating the effects of changes in aquifer storage and of aquifer heterogeneity from those due to accretion during the growing season. The data collected during the growing season were thus analyzed to determine accretion. Reasonable estimates of total and ground water evapotranspiration were obtained at the Las Animas and Lamar sites. Moreover, results from different years for these sites were in good agreement, and the seasonal distribution of computed monthly evapotranspiration generally followed the expected pattern. Analysis of the winter data from these sites provided estimates of hydraulic conductivity in good agreement with those determined from aquifer tests at nearby wells. (Woodard-USGS)
W74-03508

IMMEDIATE RESUMPTION OF GROWTH BY RADIATA PINE AFTER FIVE MONTHS OF MINIMAL TRANSPIRATION DURING DROUGHT,
Commonwealth Forestry and Timber Bureau, Canberra (Australia).
K. W. Cremer.
Aust For Res. Vol 6, No 1, p 11-16. 1972. Illus.
Identifiers: Drought, Growth, Minimal, Moisture, *Pine trees, Pinus-Radiata, Rain, Resumption, Soil, Tension, *Transpiration, *Australia.

Rooted cuttings of radiata pine (Pinus radiata D. Don) were grown in the open at Canberra, Australia to heights of about 75 cm in drained containers holding 25 l of soil. Four containers were watered to excess on 26 Feb. 1969, and their upper parts covered so as to exclude rain from the soil while still permitting ventilation of the soil and leaving the foliage exposed. After the free water had drained off, the average rate of transpiration, as gauged by the loss of weight of the covered containers, declined from 400 g/day during the first wk to 4 g/day after 10 wk, and remained at or below this rate during the trmsininh 20 wk of soil drought. When rewatered after 30 wk, 3 of the plants resumed height growth within 1 day, but the 4th died. From subsequent determinations of dry weights and of the relationship between soil moisture content and soil moisture tension (established with pressure membrane apparatus) it was estimated that during the 20 wk of very slow transpiration the average soil moisture content fell from 9.2-7.3% and the average soil moisture tension increased from 5.5-17.9 bars.--Copyright 1973, Biological Abstracts, Inc.
W74-03519

THE SIGNIFICANCE OF THE FALLOW YEAR IN THE DRY-FARMING SYSTEM OF THE GREAT KONYA BASIN, TURKEY,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
For primary bibliographic entry see Field 03F.
W74-03605

A PRACTICAL METHOD OF CALCULATING POTENTIAL EVAPOTRANSPIRATION, (IN FRENCH),
P. Brochet, and N. Gerbier.
Ann Agron (Paris). Vol 23, No 1, p 31-49. 1972, Illus. (English summary).
Identifiers: *Evapotranspiration, *Evaporimeters (Pich), Radiation, Transpiration, Measurement.

The calculation of potential evapotranspiration from the expression of the energy balance drawn up by Penman, led to a formula in which the only weather parameters involved are global radiation and the evaporation measured under shelter by means of the Pich evaporometer.--Copyright 1973, Biological Abstracts, Inc.
W74-03721

2E. Streamflow and Runoff

RESPONSE OF THE LOWER MISSISSIPPI RIVER TO CHANGES IN VALLEY SLOPE, SINUOSITY AND WATER TEMPERATURE,
Army Engineer District, Vicksburg, Miss.
L. G. Robbins.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 39-48, 1973. 5 fig, 10 ref.

Descriptors: *Streamflow, *Channel morphology, *Sediment transport, *Mississippi River, *Mississippi, Correlation analysis, Environmental effects, Water temperature, Slopes, Meanders, Flow rates, Navigation.
Identifiers: Valley slope.

The Potamology Section, Vicksburg District, Corps of Engineers, has been studying the variables influencing the morphology of the Lower Mississippi River. Three of these variables are valley slope, sinuosity, and water temperature. The similarity of valley slope and sinuosity curves and the agreement between the field and laboratory investigations support the contention that among other variables, the slope of the valley floor upon which a river flows strongly influences its pattern. The investigations on the effects that the seasonal water temperature variation has on the stage-discharge relationship, sediment transport and bed roughness exemplify the importance of recognizing the close interrelationship that exists between the various parameters. This interaction of variables could be of extreme practical significance in rivers where it is necessary to not only predict the sediment transport, but also to predict the unobstructed depths available for navigation. (See also W74-03212) (Woodard-USGS)
W74-03216

INVESTIGATION OF RUNOFF OF KAMCHATKA RIVERS BASED ON CLIMATIC DATA (ISSLEDOVANIYE STOKA REK KAMACHATKI PO KLIMATICHESKIM DANNYM),
Adademiya Nauk SSSR, Moscow. Institut Geografii.
L. S. Potapova.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 3, p 88-94, May-June 1973. 2 fig, 2 tab, 14 ref.

Descriptors: *Runoff, *Rivers, *Climatic data, Water balance, Precipitation (Atmospheric), Evaporation, Water storage, Heat balance, Runoff coefficient, Equations, Maps.
Identifiers: *USSR (Kamchatka).

A map of annual runoff, in depth in mm, for Kamchatka was constructed and refined from water and heat balances, based on long-term average monthly data of 52 meteorological and hydrologic stations. Runoff for the peninsula is highest on windward slopes in the southeast (800-1,000 mm/yr). Runoff is less on the west coast (200-400 mm/yr). Low runoff, resulting from low precipitation, was also recorded in intermontane valleys of Kamchatka rivers (100-200 mm/yr). With increasing piedmont elevation on the Central (Sredinnyy khrebet) and Eastern Ranges, runoff increases to 400-600 mm/yr. Runoff coefficients in the Kamchatka River valley are 25%-55%, on the west coast--30%-65%, and on the east coast--50%-80%. (Josefson-USGS)
W74-03259

EAGLE EYE - NEW FLOWMETER,
Dieterich Standard Corp., Boulder, Colo. Ellison Instrument Div.
For primary bibliographic entry see Field 07B.
W74-03290

AN INEXPENSIVE, FAST RESPONSE CURRENT SPEED INDICATOR,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 07B.
W74-03310

MAXIMUM BREAKER HEIGHT FOR DESIGN,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 08B.
W74-03363

THE RELATIONSHIPS BETWEEN WIND RECORDS, ENERGY OF LONGSHORE DRIFT, AND ENERGY BALANCE OFF THE COAST OF A RESTRICTED BODY OF WATER, AS APPLIED TO THE BALTIC,
Kiel Univ. (West Germany). Geologisch-Palaeontologisches Institut und Museum.
For primary bibliographic entry see Field 02J.
W74-03431

WAVE SET-UP ON A BEACH,
Royal Netherlands Meteorological Inst., De Bilt.
R. Dorrestein.
In: Proceedings of the Second Technical Conference on Hurricanes, June 1961, held Miami Beach, Florida. U.S. Weather Bureau, National Hurricane Research Project, Report No 50 Part 1, p 230-241, March 1962. 3 fig, 1 tab, 6 ref, 1 append.

Descriptors: *Beaches, *Waves (Water), *Florida, *Shallow water, Deep water, *Coasts, Ocean waves.
Identifiers: Wave set-up, Breaking waves, Wave properties.

Wave set-up is defined as the difference between the water level near the shore line when waves are running toward the coast, and the corresponding average level in deeper water. Fairchild (1958) and Saville, Jr. (1961) are referred to for results of model observations of wave set-up on a beach. Some field observations made at the fishing pier at Fernandina Beach on the Atlantic Coast of Florida are described, and the results are used to check the validity of a simplified theory relating the wave set-up to the wave properties in relatively deep water. The methodology and instrumentation which included motion pictures are described and the location of observation points at the pier is shown in a graph. The wave set-up and run-up on the beach were observed by means of 4-6 transparent, plastic tubes. A sample from the time histories of the water elevations at the plastic tubes, according to the motion pictures, for one of the observations is given in a graph. A derivation of the theoretical equation for the wave set-up is presented. The results of the field observations which are summarized in a table and afford an approximate check of the theoretical equation are discussed. It is noted that the theoretical values tend to be too low. Eleven of the possible reasons for the discrepancies are listed and discussed. It is concluded that the theory is in fair agreement with the observations but that the accuracy of both the theory and the observations can be improved. Simplifying assumptions made in applying the theory are listed in an Appendix. (Sinha - OEIS)
W74-03432

SERIES SOLUTIONS FOR SHALLOW WATER WAVES,
California Univ., Berkeley.
E. V. Laitone.
Journal of Geophysical Research, Vol 70, No 4, p 995-998, February 15, 1965. 9 ref.

Descriptors: *Shallow water, *Waves (Water), Numerical analysis.
Identifiers: Water depth, Cnoidal waves.

The purpose is to convert the second order terms for finite amplitude cnoidal waves from their reference depth based upon the water depth below the wave trough to the more appropriate expression in terms of the mean or still water depth. (Sinha-OEIS)
W74-03440

THE SPECTRAL STRUCTURE OF WAVES IN THE NEARSHORE ZONE,
For primary bibliographic entry see Field 02L.
W74-03448

THE GENERATION OF EDGE WAVES BY CYLINDRICAL WAVES IMPINGING FROM THE OUTER SEA,
Tohoku Univ., Sendai (Japan). Geophysical Inst.
K. Nakamura.
Tohoku University Science Reports, 5th Series, Geophysics, Vol 14, No 1, p 27-40, April 1962. 11 fig, 1 tab, 8 ref.

Descriptors: *Waves (Water), Tsunamis, *Coasts.
Identifiers: *Edge waves, *Wave energy.

The problem of generation of edge waves due to long waves impinging upon a continental shelf from the outer sea is investigated. A line source with an aperiodic time-dependence is assumed. The Coriolis force is omitted. A theoretical marigram at a coastal station with a large longshore distance from the source is computed. Excitation of the edge waves is governed by the depth ratio between the outer sea and the shelf, the size of the shelf, the offshore distance of the wave source, and the spectrum of the primary wave. The results may explain some observed features of the edge waves due to a tsunami. (Sinha-OEIS)
W74-03451

FEATURES OF HORIZONTAL TURBULENCE IN THE LITTORAL ZONE OF THE OCEAN,
Institute of Biology of the Southern Seas, Odessa (USSR).
D. M. Tolmazin.
Atmospheric and Oceanic Physics Series Vol 8, No 3, p 194-196, October 1972. 3 fig, 14 ref. (American Geophysical Union). Trans. from the Russian.

Descriptors: *Littoral, *Turbulence, Coasts, *Diffusion, Energy, Oceans.
Identifiers: Nearshore, Horizontal turbulence.

Previous work relating to various features of horizontal turbulence in the littoral zone of the ocean is reviewed. The morphological disturbances responsible for the existence of external turbulence scales on the order of hundreds of meters cause the diffusing admixture near the shore to pass rapidly through the inertial-subrange and dissipate in the regime of Brownian motion. This explains why the exponent in the expression describing the diffusion coefficient K as a function of the scale l of the phenomenon was always smaller than 4/3, with K almost independent of l in certain cases. With diffusion so clearly predominant in the Brownian-motion regime, K is now no longer related to the rate of turbulent-energy dissipation, but instead to the intensity of the turbulent motion. (Sinha-OEIS)
W74-03452

COASTAL SURFACE CURRENTS AROUND NEW ZEALAND,
Department of Scientific and Industrial Research, Wellington (New Zealand). Oceanographic Inst.
J. W. Brodie.
New Zealand Journal of Geology and Geophysics, Vol 3, No 2, p 235-252, May 1960. 7 fig, 3 tab, 24 ref.

Descriptors: *Ocean currents, *Winds, *Topography, Circulation, *Water circulation, Ocean circulation.
Identifiers: *New Zealand, Tasman Current, West Wind Drift, Trade Wind Drift, Drift cards.

Recoveries of drift cards from releases made off the New Zealand coast in the twelve months preceding July 1954 demonstrate the existence of a

coastal circulation, dependent on the surrounding oceanic currents and the topography for its basic pattern. The coastal current system around New Zealand driven by three major oceanic surface current systems -- the Tasman Current, West Wind Drift and Trade Wind Drift -- is conditioned by the orientation of the coastline and modified in places by extremes of local winds. The directions of flow within the system are consistent. Coastal influence including that of wind and topography is apparently limited to a zone extending round the shore 100 miles wide off the west coast and 50 miles wide off the east coast. (Sinha-OEIS)
W74-03458

LABORATORY INVESTIGATIONS OF WHITECAPS, SPRAY AND CAPILLARY WAVES,
Florida Univ., Gainesville. Coll. of Engineering.
O. H. Shemdin, R. J. Lai, A. Reece, and G. Tober.
Available from NTIS, Springfield, Va. 22151 as AD-759 407 Price $3.00 printed copy. Florida University Coastal and Oceanographic Engineering Laboratory Technical Report No 11, December 1972. 101 p, 44 fig, 10 tab, 28 ref. USN Contract N62306-71-C-0033.

Descriptors: *Ocean waves, *Sea spray, *Winds, Laboratory tests, Florida, Analytical techniques, Photography, Anemometers, Waves (Water), Wind velocity, Measurement.
Identifiers: *Whitecaps (Waves), *Capillary waves, Laser-optical device.

Laboratory investigations of whitecaps, spray and capillary waves were conducted in the wind and wave facility at the University of Florida. The percent whitecap area coverage was obtained by taking photographs of the water surface and calibrating for the photographed area distortion. Spray was measured by using a constant temperature hot-wire anemometer system. Calibration was achieved by generating uniform size drops with capillary tubes of different sizes and a crystal vibrator. Capillary waves were investigated by a laser-optical device with a frequency response greater than 100 Hz. The device was designed for the purpose of investigating the dependence of capillary waves on the wind speed. The whitecap study indicated a direct dependence of the percent whitecap area coverage on the wind speed. The presence of small amplitude mechanical waves reduces the whitecap coverage. Unstable mechanical waves increase the whitecap area coverage, however. The spray study showed that drops above the water surface interfere with the microwaves detected by a radiometer but not those detected by a radar (x-band). The capillary wave study indicated a direct increase in capillary wave energy with speed in the range 0 to 10 m/sec. The capillary wave energy is also affected by the presence of mechanical waves which increase the wave energy in the frequency range greater than 5 Hz. (Woodard-USGS)
W74-03506

BACKSCATTERING FROM A TWO-SCALE ROUGH SURFACE WITH APPLICATION TO RADAR SEA RETURN,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 07B.
W74-03509

A NON-COHERENT MODEL FOR MICROWAVE EMISSIONS AND BACKSCATTERING FROM THE SEA SURFACE,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 07B.
W74-03510

THE METEOROLOGICAL EFFECTS ON MICROWAVE APPARENT TEMPERATURES LOOKING DOWNWARD OVER A SMOOTH SEA,
Kansas Univ./Center for Research, Inc., Lawrence.
For primary bibliographic entry see Field 07B.
W74-03511

SURFACE WAVE RESONANCE ON CONTINENTAL AND ISLAND SLOPES,
Wisconsin Univ., Madison. Mathematics Research Center.
M. C. Shen, and R. E. Meyer.
Available from NTIS as AD-665 342, for $6.00 paper copy, $1.45 microfiche. MRC Technical Summary Report No. 781, June 1967. 64 p, 12 fig, 11 ref. DA-31-124-ARO (D)-462.

Descriptors: Surface water, *Beaches, *Islands, *Continental slopes, Topography, *Slopes, *Waves (Water), Resonance, Coasts.
Identifiers: Nearshore, *Geometrical optics, Surface wave spectra.

Spectra of bounded and unbounded basins are calculated on an asymptotic approximation based on smallness of the seabed slopes. This is shown to lead to a geometrical optics theory of surface waves slightly generalizing Keller's (1958), which is used to extend the known, exact result for an idealized beach to the prediction of the spectra of a variety of more natural water bodies. Attention is directed to cylindrically symmetrical and two-dimensional topographies corresponding respectively to islands and to continental slopes and laboratory channels. Marked differences are found in the character of the spectra for these two types of topography. (Sinha-OEIS)
W74-03616

ON SINGULAR BOUNDARY VALUE PROBLEMS FOR THE EPD EQUATION,
Wisconsin Univ., Madison. Dept. of Mathematics.
A. D. Taylor.
Available from NTIS as AD-478 689, for $6.00 paper copy, $1.45 microfiche. Technical Report No. 1202 (27)/4, August 1965. 108 p, 14 fig, 13 ref, append. Nonr 1202 (27), Nonr 562 (34).

Descriptors: *Waves (Water), *Beaches, Mathematical models, *Shallow water, Equations.
Identifiers: *Boundary value problems, *Wave fronts, Discontinuities.

The Euler-Poisson-Darboux equation arises in the theory of waves on shallow beaches. It is one of the simplest singular partial differential equations. A variety of physically interesting problems may be formulated as 'mixed singular boundary value problems' by prescribing additional data on curves other than the singular line. Problems of this type are well represented by the canonical 'singular boundary value problems'. The 'singular boundary value problem' defines a unique solution which shares the smoothness properties of the data on these characteristics, as defined in terms of semi-Lipschitz conditions. A study of the curious play of wave-front discontinuities of the solutions is included. (Sinha-OEIS)
W74-03617

APPROACH OF TIDES TO THE HAWAIIAN ISLANDS,
Hawaii Univ., Honolulu. Dept. of Oceanography.
K. Wyrtki, and V. Graefe.
Journal of Geophysical Research, Vol 72, No 8, p 2069-2071, April 15, 1967. 2 fig, 3 ref.

Descriptors: Sea level, *Waves (Water), *Currents (Water), *Winds, *Hawaii, Tides.
Identifiers: *Amphidromic tide waves, Trade winds, *Tidal currents, Molokai Channel (Hawaiian Islands).

Measurements of sea level on Oahu, Hawaii, and of currents in the channel between Oahu and Molokai are used to determine the direction from which the amphidromic tide waves approach the Hawaiian Islands. It is shown that the diurnal tide wave approaches the Islands from the southwest, whereas the semidiurnal approaches them from the northeast. In 1965 current measurements were made in the Molokai Channel between the islands of Oahu and Molokai. The channel is 22 nautical miles wide, has depths of 750 meters in its center, and is oriented in the direction of the trade winds without any obstructions in its approaches. A paddle-wheel current meter anchored 5 miles east of Oahu in over 110-meter depth recorded the current at 20-meter depth every 5 min during the period from March 16 to April 8. Simultaneously, a tide gage was operated in a small yacht harbor at the nearby coast. The current in the Molokai Channel is variable and largely influenced by the winds. The tidal currents are superimposed on the prevailing flow. Only during periods of weak winds are the tidal currents the dominant mode of flow. (Sinha-OEIS)
W74-03620

LONGSHORE CURRENTS AND NEARSHORE TOPOGRAPHIES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
C. J. Sonu, J. M. McCloy, and D. S. McArthur.
Available from NTIS as AD-661 170 for $6.00 paper copy, $1.45 microfiche. Technical Report No 51, Sept 1966. Also in: Proceedings of Tenth Conference on Coastal Engineering Tokyo, Japan, Sept 1966, American Society of Civil Engineers, Vol 1, Part 2, Chap 32, p 525-549, 1967. 13 fig, 5 tab, 33 ref. Nonr-1575 (03).

Descriptors: *North Carolina, *Topography, Shallow water, *Waves (Water), *Currents (Water).
Identifiers: Outer Banks (NC), *Longshore currents, Nearshore, Shoaling, Breaking waves.

Validity of seven analytical formula as well as linear and non-linear multiple regressive schemes was tested using field data from the Outer Banks, North Carolina. Generally, agreement proved unsatisfactory. Field experiences indicate that the longshore current is a velocity field consisting of a multitude of velocity vectors whose basic pattern varies depending upon the regimes of wave-current-topography interaction. The need to recognize topography as a responding variable as well as a process variable in the physical scheme of longshore current is emphasized. (Sinha - OEIS)
W74-03627

CIRCUIT FOR WATER DEPTH METER,
Vexilar, Inc., Minneapolis, Minn. (assignee).
For primary bibliographic entry see Field 07B.
W74-03666

WIND-DRIVEN WAVES,
L. F. Titov.
Available from NTIS as TT-70-50182 for $4.75 paper copy, $1.45 microfiche. NOAA and NSF TT-70-50182. 1971. 244 p, numerous fig and tab, 83 ref. Translation of Vetrovye Volnye, Leningrad, 1969.

Descriptors: *Waves (Water), Energy transfer, Winds, *Shallow water, Coasts, Climate.
Identifiers: *Wave theory, *Wind waves, Swell.

A survey is presented of theory and computation of wind waves in the sea. The theory of wind waves is presented, existing techniques for calculating wind-wave elements are discussed, and attention is given to their practical utilization. (Sinha - OEIS)
W74-03673

PROCEEDINGS OF TENTH CONFERENCE ON COASTAL ENGINEERING, TOKYO, JAPAN, SEPTEMBER, 1966, VOLUME I.
For primary bibliographic entry see Field 08B.
W74-03674

NUMERICAL CALCULATION OF WIND WAVES IN SHALLOW WATER,
Kyushu Univ., Fukuoka (Japan). Dept. of Hydraulic Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-03675

WAVE BOUNDARY LAYERS AND FRICTION FACTORS,
Technical Univ. of Denmark, Copenhagen. Coastal Engineering Lab.
For primary bibliographic entry see Field 08B.
W74-03678

2F. Groundwater

INTEGRATED SYSTEM IDENTIFICATION AND OPTIMIZATION FOR CONJUNCTIVE USE OF GROUND AND SURFACE WATER PHASE I,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
Y. Y. Haimes.
Available from the National Technical Information Service as PB-226 869; $5.00 in paper copy; $1.45 in microfiche. Ohio State Univversity Water Resources Center, Columbus, Project Completion Report, October 1973. 154 p, 19 fig, 15 tab, 32 ref, 1 append. OWRR-B-045-OHIO (1). 14-31-0001-3926.

Descriptors: *Groundwater, Surface waters, *Surface-groundwater relationships, *Transmissivity, Management, Drawdown, Recharge, Seepage, Infiltration, *Ohio, Watershed management, *Conjunctive use, *Optimization, Computer programs, Model studies.
Identifiers: Miami (Ohio), Conservancy district, Storativity, Computer coding, Parabolic differential equations, *Aquifer models.

A system identification methodology, applicable to calibration of confined and unconfined (under certain constraints) aquifer models described by two dimensional parabolic partial differential equations, has been developed. A computer program (in FORTRAN IV) simulating an aquifer using an alternating direction implicititerative procedure which has been obtained from the U.S. Geological Survey was utilized as a component in the system identification effort. Work has been completed on the formulation and coding of a digital computer software package (in FORTRAN V) capable of estimating the values of transmissivity, as a function of location within the aquifer. The identification methodology has been successfully applied to the parameter identification of an aquifer model simulating the behavior of a real aquifer system. The Fairfield-New Baltimore aquifer in southern Ohio was chosen as the problem site in collaboration with the Miami Conservancy District. The validated aquifer model is most valuable to engineers and managers concerned with groundwater systems wishing to know the response of the aquifer system to various demands placed upon it. The model will be fully utilized for the conjunctive management of ground and surface water developed in Phase II of this project.
W74-03201

DEDUCTION OF FLOW PATTERNS IN VARIABLE-DENSITY AQUIFERS FROM PRESSURE AND WATER-LEVEL OBSERVATIONS,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 04B.
W74-03236

RETENTION OF DISSOLVED CONSTITUENTS OF WASTE BY GEOLOGIC MEMBRANES,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 05B.
W74-03238

HYDROGEOLOGY OF SUBSURFACE LIQUID--WASTE STORAGE IN FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05E.
W74-03361

FEASIBILITY STUDY OF LIQUID-WASTE INJECTION INTO AQUIFERS CONTAINING SALT WATER, WILMINGTON, NORTH CAROLINA,
North Carolina Dept. of Natural and Economic Resources, Wilmington. Office of Water and Air Resources.
For primary bibliographic entry see Field 05E.
W74-03362

LIMESTONE SPRINGS AND INDIVIDUAL FLOOD EVENTS, (WITH SPECIAL REFERENCE TO THE GOWER PENINSULA, WALES),
University Coll. of Swansea (Wales). Dept. of Geography.
W. J. Chambers.
Transactions of the Cave Research Group of Great Britain, Vol 15, No 2, p 91-97, June 1973. 7 fig, 1 tab, 14 ref.

Descriptors: *Springs, *Karst hydrology, *Water chemistry, Karst, Limestones, Carbonate rocks, Limestones, Rainfall-runoff relationships, Antecedent precipitation.
Identifiers: *Wales (Gower peninsula).

All springs in the Gower Peninsula of Wales show a positive relationship with precipitation in field capacity conditions. The total hardness concentration varies directly, inversely, or not at all with precipitation. The nature of the relationship between discharge and total hardness concentration controls the total solute load and denudation rates. Intensive hourly or two-hourly automatic water sampling is a useful technique in the understanding of the chemical variation of springs. Such sampling, coinciding with stormy conditions, allows a fairly complete picture to be gained after a relatively short period of time. In certain conditions this is preferable to weekly, fortnightly, or monthly sampling programs lasting over a year. Short interval sampling also means that short-lived chemical effects are not missed. (Knapp-USGS)
W74-03512

FORCED FLOW PASSAGES IN KARST MASSIFS,
Genoa Univ. (Italy). Inst. of Geography.
For primary bibliographic entry see Field 02J.
W74-03513

SOME CALCULATIONS OF THE DENUDATION RATE IN A DOLOMITIC LIMESTONE AREA AT ISFJORD-RADIO, WEST-SPITZBERGEN,
Lund Univ. (Sweden). Dept. of Physical Geography.
For primary bibliographic entry see Field 02J.
W74-03514

HYDROGEOLOGIC CONSIDERATIONS IN LAND SPREADING OF SEWAGE TREATMENT-PLANT EFFLUENT IN CENTRAL FLORIDA,
Geological Survey, Winter Park, Fla. Water Resources Div.
For primary bibliographic entry see Field 05D.
W74-03518

2G. Water in Soils

GULLY BANK EROSION: MECHANICS AND SIMULATION BY DIGITAL COMPUTER,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 02J.
W74-03202

EDAPHIC FACTORS AND WILT OF CORIANDER,
Rajasthan Univ. Jaipur (India).
For primary bibliographic entry see Field 05C.
W74-03281

VIRUS REMOVAL IN HAWAIIAN SOILS,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 05F.
W74-03293

SATURATED WATER FLOW THROUGH CLAY POTS,
Illinois Univ., Urbana. Dept. of Plant Physiology and Horticulture.
For primary bibliographic entry see Field 03F.
W74-03306

ENRICHMENT OF MARSH HABITATS WITH ORGANIC WASTES,
Louisiana Water Resources Research Inst., Baton Rouge.
For primary bibliographic entry see Field 05D.
W74-03337

POTENTIAL OF AN ERODING URBAN SOIL FOR THE PHOSPHORUS ENRICHMENT OF STREAMS: I. EVALUATION OF METHODS,
Massey Univ., Palmerston North (New Zealand).
For primary bibliographic entry see Field 05B.
W74-03438

EFFECT OF PHOSPHATE AND CHLORIDE SALTS ON AMMONIFICATION IN WATERLOGGED SOILS,
Wisconsin Univ., Madison. Dept. of Soil Science.
J. A. Ryan, J. L. Sims, and D. E. Peaslee.
Soil Sci Am Proc. Vol 36, No 6, p 915-917. 1972. Illus.
Identifiers: *Ammonification, *Chlorides, *Phosphates, Phosphorus, Potassium, Salts, Sodium, *Soils (Waterlogged).

Extractable NH4+ in samples of soil incubated under waterlogged conditions increased as the time of incubation increased but decreased as the concentration of salt increased. The critical concentration for KH2PO4, NaH2PO4, KCl and NaCl was about 2.5 x 10-2 M. The K salts generally depressed ammonification more than the Na salts, while Cl salts generally had greater effects than the P salts.--Copyright 1973, Biological Abstracts, Inc.
W74-03445

ORGANIC COMPOUNDS IN SOIL WATER OF SOME ULTISOLS OF THE ATLANTIC COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
W. D. Nettieton, and R. J. McCracken.
J Environ Qual, Vol 1, No 4, p 387-390, 1972.
Identifiers: Agricultural chemicals, *Atlantic Coastal Plains, Compounds, *North Carolina, *Organic compounds, Phenols, *Soil water, Sugars, *Ultisols, Water.

Water samples collected from undisturbed, uncultivated, forested soils of the Atlantic Coastal Plain in Wilson County, North Carolina, were analyzed for content and composition of natural organic

substances. Sugars, organic acids, and polyphenols were detected. These results should be useful 'baseline data' for comparison with water in and from soils to which agricultural chemicals and organic wastes have been added.--Copyright 1973, Biological Abstracts, Inc.
W74-03494

SOIL SURFACE ROUGHNESS AND STRAW MULCH FOR MAXIMUM BENEFICIAL USE OF RAINFALL BY CORN ON A BLACKLAND SOIL,
Agricultural Research Service, State College, Miss.
For primary bibliographic entry see Field 03F.
W74-03515

IS PHOSPHATE REDUCED TO PHOSPHINE IN WATERLOGGED SOILS,
Reading Univ. (England). Dept. of Soil Science.
J. R. Burford, and J. M. Bremner.
Soil Biol Biochem. Vol 4, No 4, p 489-495. 1972. Illus.
Identifiers: Detectors, *Gas chromatography, Helium, Ionization, *Phosphates, *Phosphine, *Soils (Waterlogged).

A sensitive gas chromatographic method for detection and estimation of phosphine (PH3) evolved from waterlogged soils is described. It involves use of a column of Porapak Q for isothermal (100 deg C) separation of phosphine from gases known to be evolved from waterlogged soils and detection of this gas with a helium-ionization detector. Studies using this method did not confirm previous evidence for evolution of phosphine through microbial reduction of phosphate in waterlogged soils. They also showed that phosphine is sorbed by soil constituents and may not escape to the atmosphere if produced in soils.--Copyright 1973, Biological Abstracts, Inc.
W74-03523

2H. Lakes

BOTTOM MACROFAUNA IN THE GOCZALKOWICE DAM RESERVOIR IN THE YEARS 1965-1969,
Polish Academy of Sciences, Pszczyna. Hydrobiological Station.
For primary bibliographic entry see Field 05C.
W74-03271

FIELD STUDIES ON PHOTOSYNTHESIS OF CLADOPHORA GLOMERATA (CHLOROPHYTA) IN GREEN BAY, LAKE MICHIGAN,
Wisconsin Univ., Madison. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W74-03274

SOME ARCTIC LIMNOLOGY AND THE HIBERNATION OF INVERTEBRATES AND SOME FISHES IN SUB-ZERO TEMPERATURES,
Naturhistoriska Riksmuseet, Stockholm (Sweden). Section for Invertebrate Zoology.
C. Holmquist.
Archiv fur Hydrobiologie, Vol 72, No 1, p 49-70, June 1973. 1 fig, 87 ref.

Descriptors: *Overwintering sites, *Cold resistance, Aquatic plants, *Oligochaetes, *Mollusks, *Diatoms, *Chlorophyta, *Cyanophyta, Sampling, Water temperature, Aquatic habitats, *Alaska, Lakes, Freezing, Permafrost, Benthic fauna, Crustaceans, Aquatic insects, Nematodes, Diptera, Snails, Clams, Rotifers, Waterfleas, Caddisflies, Nostoc, Chara, Daphnia.
Identifiers: Survival, Hydrozoans, Turbellaria, Tardigrades, Gastrotrichd, Polychaetes, Leeches, Hydrachnids, Bryozoa, Porifera, Macroinvertebrates, Coelenterates, Water bears, Nitella, Potamogeton, Lemna trisulca, Ceratophyllum demersum, Hydra, Macrostomum, Castrada spinulosa, Mesostoma lingua, Manayunkia speciosa, Alexandrovia, Trichodrilus, Rhynchelmis, Lumbriculus variegatus, Glossiphonia complanata, Eurycercus, Sphaerium, Lymnaea, Physa, Gyraulus, Valvata, Rhizoclonium, Oedogonium.

Five shallow (less than 2 m depth) lakes in permafrost areas of northern Alaska were investigated to determine whether bottom-living animals occur and survive in frozen environments. Samples were collected in the summer of 1970. A number of macroscopic plants, algae, and animals were identified. The animals included Hydrozoa, Turbellaria, Tardigarda, Gastrotricha, Polychaeta, Oligochaeta, Hirudinea, Crustacea, Insecta, Hydrachnida, Mollusca, Bryozoa, Porifera, Nematoda, and fish. The results of the survey are discussed with respect to the possible winter temperatures of the bottom habitats for invertebrates of such areas, the frost resistance of invertebrates, the oxygen supply, the mode of hibernating in invertebrates, and the actual lakes with their animals. The available literature on low temperature survival of invertebrates is also reviewed. Since the area concerned is compound and varied topographically, geologically and climatically, and the invertebrates live in microclimatic and microecological conditions as compared with the larger, more mobile vertebrates, it is impossible to deduce anything as regarding the winter conditions of the actual lakes or the frost-resistance of animals existing there from what is known from the better-investigated temperate areas or from laboratory conditions. (Little-Battelle)
W74-03275

AN IN SITU EXAMINATION OF THE GRAZING ACTIVITIES OF NATURAL ZOOPLANKTON COMMUNITIES,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-03276

THE OCCURRENCE OF MICROTURBELLARIA IN SOME BRITISH LAKES OF DIVERSE CHEMICAL CONTENT,
Liverpool Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-03282

STUDIES ON PHYTOPLANKTON IN RELATION TO ITS PRODUCTION AND SOME PHYSICAL-CHEMICAL FACTORS IN LAKE SVINSJOEN,
Oslo Univ. (Norway). Dept. of Limnology.
For primary bibliographic entry see Field 05C.
W74-03284

THEORETICAL EFFECTS OF ARTIFICIAL DESTRATIFICATION ON ALGAL PRODUCTION IN IMPOUNDMENTS,
Harvard Univ., Cambridge, Mass. Lab. of Applied Microbiology.
For primary bibliographic entry see Field 05C.
W74-03296

HALF-SATURATION CONSTANTS FOR UPTAKE OF NITRATE AND AMMONIA BY RESERVOIR PLANKTON,
Oklahoma State Univ., Stillwater. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-03299

COMPARATIVE ECOLOGY AND ZOOPLANKTON OF TWO MARYLAND PONDS INCLUDING A CONGENERIC OCCURRENCE OF DIAPTOMUS (CALANOIDA: COPEPODA),
Edgewood Arsenal, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 05C.
W74-03308

A CONTRIBUTION TO THE ECOLOGY AND DISTRIBUTION OF AQUATIC ACARI IN THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 05C.
W74-03314

OBSERVATIONS ON RED COLORED CELLS OF PERIDINIUM WISCONSINENSE EDDY FROM BUCKHORN LAKE, ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-03320

SPECTRAL ANALYSIS OF SHALLOW WATER WAVES IN LAKE MICHIGAN,
United States Lake Survey, Detroit, Mich.
P. C. Liu.
In: Proceedings of Conference (11th) on Great Lakes Research, Milwaukee, Wisconsin, 1968, p 412-423. 9 fig, 7 ref.

Descriptors: *Shallow water, *Waves (Water), *Lake Michigan, *Coasts, Wind velocity, Lakes.
Identifiers: *Spectrum analysis, Energy spectrum, *Wind waves.

Wave characteristics derived from spectral analysis of waves measured near Pentwater Harbor, Lake Michigan, were correlated with wind histories. The energy spectrum of shallow water waves generally resembles that of deep water waves. The effect of shallow water becomes dominant for the extended high intensitywind field. The appearance of two spectral peaks usually denotes the spectrum relating to a decreasing speed wind field. (Si
W74-03439

ECOLOGICAL STUDIES ON DISSOLVED OXYGEN AND BLOOM OF MICROCYSTIS IN LAKE SUWA: I. HORIZONTAL DISTRIBUTION OF DISSOLVED OXYGEN IN RELATION TO DRIFTING OF MICROCYSTIS BY WIND,
Shinshu Univ., Suwa (Japan). Suwa Hydrobiological Station.
For primary bibliographic entry see Field 05C.
W74-03524

BIOGENIC METAMORPHOSIS OF WATER IN LAKES OF THE AMU-DAR'YA DELTA (O BIOGENNOY METAMORFIZATSII VODY V OZERAKH DEL'TY AMUDAR'I),
L. G. Konstantinova.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 52-59, 1972. 3 fig, 6 tab, 20 ref.

Descriptors: *Water chemistry, *Reduction (Chemical), *Sulfates, *Lakes, *Deltas, Inorganic compounds, Sulfides, Hydrogen sulfide, Sulfur bacteria, Microbiology, Water sampling, Water analysis.
Identifiers: *USSR (Amu-Dar'ya River), Water exchange, Mineralization.

Biogenic reduction of sulfates in lower reaches of the Amu-Dar'ya delta in Kara-Kalpak ASSR was investigated in the Dautkul' group of lakes and in Lakes Koksu, Shegekul', Karateren', and Ashchikul'. Biogenic reduction of sulfates is widespread in water bodies of the Amu-Dar'ya delta. Intensification of sulfate reduction was observed in the lakes in the absence of water exchange and, in an isolated water sample, there

was an almost complete reduction of sulfates. (Josefson-USGS)
W74-03531

ION LOAD AND CARBONATE EQUILIBRIUM IN THE TROITSK RESERVOIR (AKKUMULYATSIYA IONNOGO STOKA I KARBONATNOYE RAVNOVESIYE V TROITSKOM VODOKHRANILISHCHE),
Magnitogorskii Gorno-Metallurgicheskii Institut (USSR).
Z. F. Krivopalova, and K. B. Zhaggar.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 46-51, 1972. 1 fig, 5 tab, 19 ref.

Descriptors: *Water chemistry, *Reservoirs, *Ions, *Calcium carbonate, *Equilibrium, Saturation, Supersaturation, Inorganic compounds, Carbon dioxide, Chlorides, Sulfates, Discharge (Water), Seasonal, Equations.
Identifiers: *USSR (Troitsk Reservoir).

The Troitsk Reservoir in southern Chelyabinsk Oblast was constructed in 1960 on the Uy River, a tributary of the Tobol. Total ion load in the tailrace channel of the reservoir in 1965 was 2% greater than the load carried by the streams. The Cl load increased by 16%, and the SO4 load decreased by 10%. Regulation of the Uy River resulted in a reduced ion load in spring and summer and in an increased ion loan in winter. Water of the Uy River in upper reaches of the reservoir in winter and spring was unsaturated by CaCO3, and the concentration of aggressive CO2 was high (17.6-24.2 mg/liter). In reservoir reaches where an artificial heat regime was formed, the water was almost always saturated or supersaturated by CaCO3. During the flood of April 1965, the concentration of aggressive CO2 was below permissible limits and posed no threat to concrete structures. (Josefson-USGS)
W74-03532

TECHNIQUES IN FORECASTING CONTENT OF ORGANIC AND BIOGENIC SUBSTANCES IN WATER OF EXISTING AND PROPOSED WATER BODIES (K METODIKE PROGNOZIROVANIYA SODERZHANIYA ORGANICHESKIKH I BIOGENNYKH VESHCHESTV V VODE SUSHCHESTVUYUSHCHIKH I PROYEKTIR UYEMYKH VODOYEMOV),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
Yu. G. Maystrenko, and A. I. Denisova.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 86-114, 1972. 12 fig, 14 tab, 33 ref.

Descriptors: *Water chemistry, *Organic compounds, *Inorganic compounds, *Reservoirs, *Forecasting, Nitrogen compounds, Phosphorus compounds, Gases, Oxidation, Vegetation, Aquatic plants, Plankton, Soils, Precipitation (Atmospheric), Equations.
Identifiers: *USSR, Kiev Reservoir, Kremenchug Reservoir, Kakhovka Reservoir, Organic carbon.

Water- and salt-balance equations and empirical coefficients for different types of vegetation, plankton, and soils can be used to forecast organic and biogenic substances in proposed bodies of water. Suggested techniques for forecasting organic and biogenic substances were tested in the Kiev, Kremenchug, and Kakhovka Reservoirs on the Dnieper River by comparing computed values of organic carbon, organic nitrogen, permanganate and bichromate oxidizability, ammonium- and nitrate-nitrogen, and total and dissolved phosphorus with field data obtained during the first years of reservoir impoundment. Differences between average annual concentrations of organic and biogenic substances in reservoir water and predicted values range from minus 0.9% to +5.0% for carbon, from +5.5% to minus 9.0% for organic nitrogen, from minus 0.9% to minus 5.5% for permanganate oxidizability, from +1.0% to minus 7.5% for bichromate oxidizability, from minus 9.2% to +21.0% for ammonium nitrogen, from +3.0% to minus 7.0% for nitrate nitrogen, and from +7.5% to +32.0% for total and dissolved phosphorus. (Josefson-USGS)
W74-03535

DELAYED RECOVERY OF A MESOTROPHIC LAKE AFTER NUTRIENT DIVERSION,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05C.
W74-03560

IMPORTANCE OF DIATOMS IN THE PRESENT VARVE DEPOSITION (ALTERNATION OF ANNUAL LAYERS) OF GREEN LAKE (NEAR FAYETTEVILLE, N.Y.), MODEL OF CONFINED SEDIMENTATION, (IN FRENCH),
Museum National d'Histoire Naturelle, Paris (France). Laboratoire de Geologie.
G. Busson, S. D. Ludlam, and D. Noel.
C R Hebd Seances Acad Sci Ser D Sci Nat. Vol 247, No 23, p 3044-3047. 1972. Illus.
Identifiers: Annual, *Diatoms, Lakes, Layers, Minerals, Model studies, *New York (Green Lake), Organic, Sedimentation, *Varve deposition.

The Green Lake varves, model of present layered sedimentation, can hardly be considered as a case of exclusively chemical sedimentation. Thus, these varves are closer to conventional laminae involving the combination of organic matter with mineral matter. In these laminites the plankton organisms have a constitutive role which is equally significant within layers with 'organic matter' as in the mineral layers. In the mineral layers, fragments of calcareous nannoplankton or frustules of diatoms or others are involved.--Copyright 1973, Biological Abstracts, Inc.
W74-03577

WIND DRIVEN WATER CURRENTS,
Toronto Univ. (Ontario). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 08B.
W74-03619

WINDS, WIND SET-UPS, AND SEICHES ON LAKE ERIE,
United States Lake Survey, Detroit, Mich.
For primary bibliographic entry see Field 08B.
W74-03625

THE FORMATION OF PHYTOCENOSES ON THE LIBERATED GROUND OF LAKE SEVAN, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Biogeography.
A. G. Voronov, and R. O. Geodakyan.
Bio Zh Arm. Vol 25, No 3, p 72-78. 1972. Illus.
Identifiers: Chenopodium-Album, Crambe-Orientalis, Estuaries, Glyceria-Aquatica, Glyceria-Plicata, Jacker community, Juncus-Bufonius, Lakes, Phragmites-Communis, *Phytocenoses, Polygonum-Aviculare, Rivers, Trifolium-Repens, *USSR (Lake Sevan), Veronica-Anagalis-Aquatica, *Overgrowth.

First stages of overgrowth with mixed pioneer groups of plants were observed in 1969 on sand bars and estuaries of rivers Martuni and Argichi (USSR). The first plants were Glyceria aquatica, Veronica anagalis aquatica, Juncus bufonius, Polygonum aviculare and other annual plants with a Jackar community coefficient as low as 38%. During the second yr, many more and different plants, predominantly perennial ones, including Trifolium repens, appeared, raising the coefficient to 62% at the Argichi river and 100% at the Martuni river. The phytocenosis on the brows of the lake itself was of different character, since the surf exerted a mechanical and packing effect on the ground which effected the selection of plants. Here were observed Chenopodium album, and Polygonum aviculare (annuals) and Crambe orientalis, Phragmites communis, and Glyceria plicata (perennials).--Copyright 1973, Biological Abstracts, Inc.
W74-03632

READILY HYDROSABLE ORGANIC MATTER IN BOTTOM SEDIMENTS OF LAKE BAIKAL, (IN RUSSIAN),
For primary bibliographic entry see Field 05C.
W74-03715

2I. Water in Plants

THE CONSTRUCTION OF A SAND PROFILE SAMPLER: ITS USE IN THE STUDY OF THE VORTICELLA POPULATIONS AND THE GENERAL INTERSTITIAL MICROFAUNA OF SLOW SAND FILTERS,
Surrey Univ., Guilford, (England). Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W74-03286

STREPTOCEPHALUS MOOREI N. SP., A NEW FAIRY SHRIMP (ANOSTRACA) FROM MEXICO,
Arizona State Univ., Tempe. Dept. of Zoology.
D. Belk.
Transactions of the American Microscopical Society, Vol 92, No 3, p 507-512, July 1973. 7 fig, 3 ref.

Descriptors: *Crustaceans, Aquatic animals, *Systematics, *Speciation, Invertebrates, *Mexico.
Identifiers: *Fairy shrimp, *Streptocephalus moorei, Animal morphology, Anostraca, Macroinvertebrates, Scanning electron microscopy, Sample preparation, Sample preservation.

More than 200 specimens of the genus Streptocephalus were collected in Chihuahua, Mexico, and fixed in 70 percent ethanol. A few specimens were washed in several changes of distilled water for 24 hr before placing them in 10 percent formalin for 24 hr. The fairy shrimp were then prepared for study by scanning electron microscopy. The Anostraca collected were a new species, S. moorei; the species is fully described and compared with other species already known for the genus. (Holoman-Battelle)
W74-03319

FORMATION OF THE ANNUAL RING AND THE ACCUMULATION OF ORGANIC MATTER IN TREES, (IN RUSSIAN).
Sovetskii Natsionalnyi Komitet po Provedeniyu Mezhdunarodnoi Biologicheskoi Programmy, Moscow (USSR).

Nauka: Moscow. 1970. 129 p. Illus.
Identifiers: Accumulation, Deficiency, Formation, Light, Moisture, *Organic matter, Precipitation, Productivity, Temperature, *Tree rings (Annual).

The diameter increment of trees in different geographical zones and the external (solar radiation, air temperature, precipitation) and internal factors (moisture deficiency in the tree) in the formation of the annual ring are discussed. The relation between the tree increment and the climate fluctuations is described, and ways of forecasting the variations of climate are presented. The produc-

tivity of trees and stands, the dynamics of accumulation of organic matter, and an analysis of the distribution of the organic matter within the tree are discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-03466

PHYSIOLOGY OF DROUGHT RESISTANCE IN THE SOYBEAN PLANT (GLYCINE MAX): I. THE RELATIONSHIP BETWEEN DROUGHT RESISTANCE AND GROWTH,
Sheffield Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 03F.
W74-03475

THE FEEDING ECOLOGY OF THE ROCK GREENLING, HEXAGRAMMOS LAGOCEPHALUS, IN THE INSHORE WATERS OF AMCHITKA ISLAND, ALASKA,
Washington Univ., Seattle. Coll. of Fisheries.
C. A. Simenstad.
Available from the National Technical Information Service as TID-26129 $3.00 in paper copy copy, $1.45 in microfiche. M Sc Thesis, 1971. 131 p, 14 fig, 16 tab, 60 ref, 3 append. AEC Contract AT (26-1)-171.

Descriptors: *Fish food organisms, *Ecosystems, *Aquatic life, *Alaska, Surveys, Food habits, Aquatic algae, Aquatic animals, Aquatic environment, Growth stages, Fish diets, Analytical techniques, Biomass.
Identifiers: *Rock greenling, Hexagrammos lagocephalus, Amchitka Island (Alaska).

Analysis of the stomach contents of 596 rock greenling, Hexagrammos lagocephalus, collected from the inshore waters of Amchitka Island, Alaska, indicated the fish to be a benthophage ingesting a diverse spectrum of macroinvertebrates, fish, and algae. Prey organisms represented exclusively from both intertidal or subtidal habitats suggest movement onto the intertidal bench during high tide for the purpose of feeding. Diet composition of indetifiable food organisms by biomass consisted of amphipods (43.2%), miscellaneous organisms and identifiable nonfood matter (31.9%), mysids (10.2%), molluscs (6.4%), fish (4.5%), decapoda (2.8%), and copepods (1.0%). Rank by percentage occurrence was similar except for reversal of the mollusc and mysid categories. Greenling appear to feed continuously with a slight diurnal emphasis and to have a relatively high proportion of digested food in the stomach. While no differences in the annual composition of the diet was noted in 1968-1970, the yearly total biomass ingested per fish was significantly different. (Woodard-USGS)
W74-03505

LIFE CYCLE OF ORCHARDGRASS (DACTYLIS GLOMERATA L.) IN THE FLOOD MEADOWS OF THE OKA RIVER: I, (IN RUSSIAN),
V. N. Egorova.
Byull Mosk O-Va Ispyt Prir Otd Biol, Vol 77, No 4, p 118-129, 1972, Illus, English summary.
Identifiers: Dactylis-glomerata, Flood meadows, Grass, *Life cycle, Ontogeny, *Orchard grass, River, *USSR (Oka River).

Eleven age groups are recognized in the ontogenesis of D. glomerata, based on the complex of biomorphological characters of the overground and underground organs of the plant as observed in the USSR. The individual, developing from a seed, does not preserve its integrity through its whole life. With aging of the individuals, the character of the tillering undergoes substantial changes. During the second half of the ontogenesis, the longevity of the shoots decreases.--Copyright 1973, Biological Abstracts, Inc.
W74-03604

THE STRUCTURE OF SAPROBIC COMMUNITIES,
Prague Dept. of Water Technology (Czechoslovakia).
V. Sladecek.
Int Rev Gesamten Hydrobiol, Vol 57, No 3, p 361-366, 1972, Illus.
Identifiers: Decomposition, *Eltonian pyramid, *Saprobic communities.

Eltonian pyramids have served as patterns to show the structure of saprobic communities. A saprobic triangle was developed and divided irregularly into zones occupied by producers, consumers and decomposers. Subdivisions were made in each zone and the left half of the triangle was depicted twice in more detail (plankton and benthos being considered separately). Lastly, a saprobic half-circle was introduced in which both plankton and benthos were considered at the same time. All schemes cover only freshwater and are considered as tentative. They may be corrected, improved and developed.--Copyright 1973, Biological Abstracts, Inc.
W74-03746

2J. Erosion and Sedimentation

GULLY BANK EROSION: MECHANICS AND SIMULATION BY DIGITAL COMPUTER,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. C. Taylor, and H. P. Johnson.
Available from National Technical Information Service as PB-227 017; $12.00 in paper copy, $1.45 in microfiche. Iowa Water Resources Research Institute, Ames, Completion Report ISWRRI-48, September, 1973. 163 p, 20 fig, 2 tab, 34 ref. OWRR A-034-IA (1).

Descriptors: *Simulation analysis, Computer models, *Bank erosion, *Gully erosion, Erosion rates, Computer programs, *Bank stability, Groundwater, Seepage, *Soil erosion, *Iowa.

The main objective was to develop concepts of the mechanics of gully bank failures, specifically, the effect of groundwater on soil shear strength and the interaction with gravitational forces on the soil. The concepts were expressed as digital computer programs that evaluate gully bank stability. Two groundwater flow systems defined as boundary value problems were solved for the hydraulic potential function by a modified Gram-Schmidt technique. One model can be used to evaluate effects of seepage recharge on groundwater flow into the gully. The second was used to analyze the effects of water table fluctuations in the vicinity of the gully bank, notably cases of rapid drawdown. The solutions apply to gullies with sloping banks which are seepage faces for groundwater. The results generated by the model using typical dimensions and soil parameters for gullies in loess soils of western Iowa were not compared directly to field cases. However, the reactions of the model to variations in water table heights and changes in the cohesion intercept of the Mohr-Coulomb Failure Law were in accordance with general field experience.
W74-03202

PROCEEDINGS, MISSISSIPPI WATER RESOURCES CONFERENCE, 1973.
Mississippi State Univ., State College. Water Resources Research Inst.
For primary bibliographic entry see Field 05B.
W74-03212

NITROGEN, PHOSPORUS AND OTHER CHEMICALS IN SEDIMENTS FROM RESERVOIRS IN NORTH MISSISSIPPI,
Mississippi Univ., University.
For primary bibliographic entry see Field 05B.
W74-03213

SEDIMENT YIELD ESTIMATES BASED ON FLOODWATER MEASUREMENTS AND SAMPLES,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
J. C. Willis, A. J. Bowie, and D. A. Parsons.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 13-29, 1973. 7 fig, 9 tab, 10 ref.

Descriptors: *Sediment transport, *Streamflow, *Sediment yield, *Mississippi, Floods, Flow rates, Correlation analysis, Sediments, Particle size, Sediment control, Erosion control, Data collections, Sampling, Planning, Levees.
Identifiers: *Coles Creek (Miss), *Buffalo River (Miss).

An investigation was conducted in southwest Mississippi in cooperation with the Soil Conservation to determine the sediment yields of Coles Creek and Buffalo River. The watershed areas are 257 sq mi and 182 sq mi, respectively. The floodwater sampling and water discharge measurements were made during August 1967 to April 1969. The sediment contents of floodwater samples were related to water flow rates to give sediment-water discharge ratings for both sands and fine sediments. Flow-duration relationships were established which defined the relation between water flow rate and the proportion of the time that the rate was exceeded. The flow-duration relationships were then combined with the flow-sediment discharge information to give sediment discharge-time association in the form of curves and tables of rates of sediment discharge against the proportion of the total time during which they occur. The measured sand yields were at about the same rate for the two watersheds: 1.00 ton/acre/year and 1.21 tons/acre/year for Coles Creek and Buffalo River, respectively. The big difference was in the yield of fines: 4.56 tons/acre/year for Coles Creek and 1.71 tons/acre/year for Buffalo River. (See also W74-03212) (Woodard-USGS)
W74-03214

RESPONSE OF THE LOWER MISSISSIPPI RIVER TO CHANGES IN VALLEY SLOPE, SINUOSITY AND WATER TEMPERATURE,
Army Engineer District, Vicksburg, Miss.
For primary bibliographic entry see Field 02E.
W74-03216

MOVEMENT AND ACCUMULATION OF SUSPENDED SEDIMENT DURING BASIN RECHARGE,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 04B.
W74-03240

TRACE ELEMENTS IN BOTTOM SEDIMENTS OF DNIEPER RIVER RESERVOIRS (MIKROELEMENTY V DONNYKH OTLOZHENIYAKH VODOKHRANILISHCH R. DNEPRA),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 02K.
W74-03254

SEDIMENT COLIFORM POPULATIONS AND POST CHLORINATION BEHAVIOR OF WASTEWATER BACTERIA,
Harris County Pollution Control Dept. Houston, Tex.
For primary bibliographic entry see Field 05A.
W74-03295

MORPHOMETRIC ANALYSIS OF SHORT--PERIOD CHANGES IN THE TOPOGRAPHY OF THE SHORE,
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.

V. R. Boynagryan.
Oceanology, Vol 6, No 4, p 534-540, April 1967. 4 fig, 4 tab, 14 ref.

Descriptors: *Sediment transport, *Topography, Morphology, Slopes, *Beaches, Shores, *Coasts, *Shallow water.
Identifiers: *Baltic Sea, Morphometric analysis.

Experimental field data are presented to support the view that it is possible to estimate mass movements of sand indirectly by studying the morphometry of the submarine beach slope and by computing material-moving forces by hydrometeorological methods for the period of observation. An attempt is made using morphometric analyses to explain reconstruction of the topography of the submarine beach slope in a shallow-water area in the Southeastern Baltic. The information employed was obtained in the summer of 1963 during operations of an expedition from the Institute of Oceanography, USSR Academy of Sciences and the Institute's Kaliningrad Department. Soundings were made using a PEL-2 echo-sounder installed aboard a BAV amphibious vehicle over an area 950 m long, along 19 parallel lines 50 m apart, orientated normal to the coast. (Sinha-OEIS)
W74-03341

EFFECTS OF PARTICLE SIZE AND WAVE STATE ON GRAIN DISPERSION,
Chicago Univ., Ill. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 02L.
W74-03344

RECENT COASTAL SEDIMENTATION: CENTRAL LOUISIANA COAST,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02L.
W74-03345

TRACE-ELEMENT DISTRIBUTION IN THE CONTINENTAL-SHELF SEDIMENTS OFF THE EAST COAST OF INDIA,
Andhra Univ., Waltair (India). Dept. of Geology.
N. V. N. Durgaprasada Rao, and M. Poornachandra Rao.
Marine Geology, Vol 15, No 3, p M43-M48, October 1973. 3 fig, 2 tab, 5 ref.

Descriptors: *Clays, *Trace elements, *Continental shelf, *Metals, Distribution patterns, Clay minerals, Adsorption, Provenance, Organic matter, Copper, Chromium, Cobalt, Nickel, Lead, Zinc, Molybdenum, Strontium.
Identifiers: *India, Barium, Boron, Tin, Germanium, Gallium, Vanadium.

Thirty continental-shelf clays sampled off the east coast of India were analyzed spectrographically to determine the concentrations of Ge, Ga, Pb, Cu, Mo, Sn, V, Ni, Co, Zr, Cr, Ba, Sr, and B. Most of these elements are detrital in origin and are primarily held in clay minerals or adsorbed onto the clays in the nearshore mixing zone. Organic matter influences the concentrations of Ge, Sn, and to a lesser extent, Ga and Pb in the shelf. (Knapp-USGS)
W74-03350

STRUCTURE AND TEXTURE OF A GRAVELLY BARRIER ISLAND IN THE FITZROY ESTUARY, WESTERN AUSTRALIA, AND THE ROLE OF MANGROVES IN THE SHORE DYNAMICS,
Australian National Univ., Canberra. Dept. of Biogeography and Geomorphology.
For primary bibliographic entry see Field 02L.
W74-03351

OXYGEN AND CARBON ISOTOPE COMPOSITIONS OF ALTERED CARBONATES FROM THE WESTERN PACIFIC, CORE 53.0, DEEP SEA DRILLING PROJECT,
Illinois Univ., Urbana. Dept. of Geology.
T. F. Anderson.
Marine Geology, Vol 15, No 3, p 169-180, October 1973. 1 fig, 3 tab, 43 ref.

Descriptors: *Limestones, *Diagenesis, *Weathering, *Igneous rocks, Water chemistry, Pore water, Sea water, Connate water, Oxygen isotopes, Carbonate rocks, Pacific Ocean, *Carbonates.
Identifiers: Volcanic rocks.

In the lower part of Deep Sea Drilling Project core no. 53.0, partly recrystallized carbonate sediments and well recrystallized limestone breccias of Oligo-Miocene age are associated with altered volcanic flows, lithified tuffs, and tuff breccias, suggesting that carbonate alteration was the result of thermal metamorphism. However, the oxygen isotope compositions of these carbonates are not compatible with recrystallization and isotope exchange with seawater at high temperatures. The following approximate maximum temperatures of recrystallization were calculated: limestone breccias, 100 deg C; calcite veins rimming breccia clasts, 30 deg C; and unconsolidated sediments overlying the breccias, 20 deg C. Therefore, the volcanics at site 53.0 must have been emplaced into the primary carbonate sediments at relatively low temperatures. Subsequent carbonate alteration was probably a consequence of chemical changes in ambient pore waters resulting from the submarine weathering of volcanic material. (Knapp-USGS)
W74-03352

AN INSTRUMENTATION SYSTEM TO MEASURE NEAR-BOTTOM CONDITIONS ON THE CONTINENTAL SHELF,
Washington Univ., Seattle. Dept. of Oceanography.
R. W. Sternberg, D. R. Morrison, and J. A. Trimble.
Marine Geology, Vol 15, No 3, p 181-189, October 1973. 5 fig, 1 ref.

Descriptors: *Instrumentation, *Current meters, *Continental shelf, Sediment transport, Currents (Water), Sedimentation, Photography, *Pacific Ocean.

An instrumentation system was designed for use in measuring currents on the floor of the continental shelf. It can remain submerged for periods of one month continuously recording water speed and direction 1 m from the seabed, differential pressure, and bed nature by means of half-hourly photographs. Four of these systems are presently in use in arrays across the continental shelf of Washington. Over 35 tests were made to depths ranging from 20 to 175 m and for periods of hours to four weeks. The combination of current-meter data and bottom photographs clearly illustrates the nature of the bed, the relationship between sediment movement and the velocity 1 m off the bed, and the mode of transport (suspended load). (Knapp-USGS)
W74-03353

TIME-INTERVAL PHOTOGRAPHY OF LITTORAL PHENOMENA,
Army Coastal Engineering Research Center, Washington, D.C. Engineering Development Div.
D. W. Berg, and E. F. Hawley.
Reprint No 9-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 39, p 725-745, 1972. 11 fig, 1 tab, 10 ref, append.

Descriptors: *Data collections, *Beaches, *Coastal engineering, *Photography, *Beach erosion, Waves (Water), Surf, Sedimentation, Sediment transport, Shores, Coasts, *California.
Identifiers: Time-lapse photography.

An approach to minimize the need for personnel in collecting data on littoral phenomena involves the use of a photographic technique, using time-interval cinematography. Two such systems were tested at Point Mugu and Newport Beach, California. This method incorporates commercially available 16 mm motion picture cameras with automatic lenses, remotely programmed to shoot selected lengths of film at predetermined periods during a day, every day. At Point Mugu the camera, housed in a weatherproof enclosure mounted atop an existing 100-foot tower, records shoreline conditions, wave characteristics and existing weather twice a day for a period of 20 seconds per exposure. The cameras are normally serviced on a weekly basis but are capable of longer unattended operation. (Knapp-USGS)
W74-03364

CHARACTER AND STABILITY OF A NATURAL TIDAL INLET,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-03365

CASE HISTORY OF MISSION BAY INLET, SAN DIEGO, CALIFORNIA,
Moffat and Nichols, Long Beach, Calif.
For primary bibliographic entry see Field 08B.
W74-03366

A GROSS LONGSHORE TRANSPORT RATE FORMULA,
Army Coastal Engineering Research Center, Washington, D.C. Coastal Processes Branch.
C. J. Galvin, Jr.
Reprint No 12-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 50, p 953-970, 1972. 5 fig, 2 tab, 42 ref.

Descriptors: *Littoral drift, *Suspended load, Equations, Coastal engineering, Sediment transport, Surf, Waves (Water), Currents (Water).

Gross longshore transport rates for 11 long-term field measurements are predicted reasonably well by an empirical relation relating longshore transport rate to mean breaker height. A physical explanation of this empirical relation assumes that most littoral drift is transported in suspension, and that the empirical relation is an equation for conservation of suspended sediment in the longshore current. (Knapp-USGS)
W74-03367

SUSPENDED SEDIMENT AND LONGSHORE SEDIMENT TRANSPORT DATA REVIEW,
Army Coastal Engineering Research Center, Washington, D.C.
M. M. Das.
Reprint No 13-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 54, p 1027-1048, 1972. 7 fig, 47 ref.

Descriptors: *Suspended load, *Surf, *Waves (Water), *Littoral drift, Sediment transport, Turbulence, Turbulent flow, Coastal engineering, Reviews.

Studies of suspended sediment under waves are reviewed. Although about five analytical or semi-empirical approaches have been attempted to pre-

dict the vertical distribution of suspended sediment, none of the approaches has had its general validity proven. This is mainly due to the lack of knowledge about the characteristics of turbulence of the wave boundary layer and to the lack of a suitable suspended sediment measuring technique for use in waves. An optical system shows promise in obtaining information on the mechanics of suspension under waves. Turbulence is the major cause of suspension of sediment in a turbulent flow. The only source of turbulence under waves is the boundary layer, except near breakers. (Knapp-USGS)
W74-03368

LONGSHORE TRANSPORT OF SUSPENDED SEDIMENT,
Army Coastal Engineering Research Center, Washington, D.C.
J. C. Fairchild.
Reprint No 17-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 56, p 1069-1088, 1972. 13 fig, 9 ref.

Descriptors: *Suspended load, *Surf, *Littoral drift, Sands, Beaches, Sampling, Sediment transport, Waves (Water), Coastal engineering, New Jersey, North Carolina.

Suspended sediment samples were collected from stations along the City Pier, Ventnor, New Jersey, and Jennettes Pier, Nags Head, North Carolina. Most samples were collected within the surf zone at the Ventnor site. At the Nags Head site sample collections included the surf zone, but generally extended over a wider range of the nearshore zone. Collection elevation varied from 3 inches above the bottom up to a maximum at about mid-depth, generally not greater than 2.5 feet above bottom. Maximum concentrations at Ventnor ranged up to 2.6 ppt by weight and at Nags Head were about 4.0 ppt. Median size at Ventnor ranged from 0.12 to 0.15 mm and averaged about 0.20 mm in depths of 4 feet and less at Nags Head. Averages of surf zone concentration in waves up to 4 feet high show significant variation in concentration with elevation above the bottom. The higher the level of wave activity the less concentration varies with elevation above bottom, and hence the flatter the trend in the distribution curve. For waves approaching their breaking depth, the concentration of suspended sediment rises sharply just before the wave breaks, peaking at a wave height-to-water depth ratio of about 0.78 (theoretical breaker index). Concentration then drops off more slowly shoreward of the initial wave breaking. Median size of the suspended sediment samples decreases gradually with increase in water depth and with increase in sampling elevation above the ocean bottom. There is some implication that a flatter distribution of sand size with height, as found in the smaller size Ventnor sand, may be indicative of higher concentrations for smaller more uniformly mixed sands. (Knapp-USGS)
W74-03369

STATE OF GROIN DESIGN AND EFFECTIVENESS,
Army Coastal Engineering Research Center, Washington, D.C. Evaluation Branch.
For primary bibliographic entry see Field 08A.
W74-03370

REMOTE SENSING IN THE STUDY OF COASTAL PROCESSES,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 07B.
W74-03373

COASTAL APPLICATIONS OF THE ERTS-A SATELLITE,
Army Coastal Engineering Research Center, Washington, D.C.
O. T. Magoon, D. M. Pirie, and J. W. Jarman.
Reprint No 18-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 117, p 2065-2073, 1972. 4 fig, 3 ref.

Descriptors: *Remote sensing, *Coasts, *Satellites (Artificial), Coastal engineering, Waves (Water), Sedimentology, Sedimentation, Shoals, Erosion, Beach erosion, Turbidity, Currents (Water).
Identifiers: ERTS-A.

The Earth Resources Technology Satellite (ERTS) was placed in orbit in July 1972. ERTS imagery will be of use to coastal investigators in two principal areas: study of coastal sediment and related water mass movement through the repeated monitoring of coastal sediment plumes, and for the study of changes in highly variable sections of coasts such as offshore barrier islands and erodible shoals. Use of ERTS imagery in studies relating to deep water wave direction is problematical depending on the resolution of water surface waves. (Knapp-USGS)
W74-03374

THE RELATIONSHIPS BETWEEN WIND RECORDS, ENERGY OF LONGSHORE DRIFT, AND ENERGY BALANCE OFF THE COAST OF A RESTRICTED BODY OF WATER, AS APPLIED TO THE BALTIC,
Kiel Univ. (West Germany). Geologisch-Palaeontologisches Institut und Museum.
K. Vollbrecht.
Marine Geology, Vol 4, No 2, p 119-147, April 1966. 19 fig, 15 ref.

Descriptors: *Coasts, Winds, *Waves (Water), *Forecasting, *Littoral drift, *Sediment transport.
Identifiers: Longshore drift, Energy balance, Drift energy, *Baltic Sea.

An attempt is made to derive from wind records the intensity of the longshore drift. Based upon the fundamentals of modern wave forecasting and knowledge of the relative efficiency of different angles of wave approach, the yearly course of drift energy is calculated for four points on the coast of Schleswig-Holstein (western coast of the Baltic). By subdividing the wind records into four classes of strength, four patterns of drift energy related to distinct zones of water depth are presented. A comparison of the drift energy calculated for three neighboring points permits a derivation of energy balance for the central point. The knowledge of the patterns of both drift energy and energy balance allows insight into the mechanism of the longshore drift. Until the present time, however, the quantitative relationships between drift energy and true volume of material transported thereby are still unknown. To avoid disturbing influences of distant wave patterns the energy cannot be calculated in the manner applied here, the method presented is valid only for a restricted area, i.e., the magnitude of the more or less uniform wind field should be similar to that of the corresponding marine area. (Sinha - OEIS)
W74-03431

BEACH CHANGES, ON THE CENTRAL TEXAS COAST ASSOCIATED WITH HURRICANE FERN, SEPTEMBER, 1971,
Western Michigan Univ., Kalamazoo. Dept. of Geology.
R. A. Davis, Jr.
Texas University Contributions in Marine Science Vol 16, p 89-98, 1972. 5 fig, 10 ref.

Descriptors: *Texas, *Beach erosion, *Hurricanes, Barrier islands, *Wind velocity, *Storms, Tides, *Wind tides, Sedimentation.
Identifiers: Beach profiles, Swash bars, Low-energy environments.

Hurricane Fern crossed the central Texas barrier island system on September 10, 1971, imparting a considerable amount of physical energy on gulf beaches. Beach erosion caused pronounced changes in profile configuration. The volume of sediment removed was at least as much as that removed by Hurricane Celia the year before, even though the wind velocity during Celia was three times that of Fern. Partial recovery of the beaches began several days after passage of the storm with shoreward migration and welding of small swash bars. The following general statements are appropriate for hurricane generated beach changes: (1) The total volume of sediment loss resulting from such a storm is large and accounts for most of the longterm erosion along the relatively low energy barrier island beaches of central Texas. (2) The rate of movement of the storm is one of the most significant factors in beach erosion. Slow moving storms generate large waves and high storm tides which are the most important factors in beach erosion. (3) Post-storm recovery of the beach is quite slow and may not be completed before the next severe storm arrives. (Sinha - OEIS)
W74-03433

THE OLD COASTLINE OF THE WASH,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 02L.
W74-03435

SIZE DISTRIBUTIONS OF THE SUSPENDED PARTICLES OF THE CHESAPEAKE BAY TURBIDITY MAXIMUM,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 02L.
W74-03436

DYNAMIC CHARACTERISTICS OF WEST FLORIDA GULF COAST BEACHES,
University of Southern California, Los Angeles. Dept. of Geology.
D. S. Gorsline.
Marine Geology, Vol 4, p 187-206, 1966. 16 fig, 5 tab, 23 ref.

Descriptors: *Florida, Gulf Coastal Plain, *Sediment transport, Waves (Water), *Beaches, Currents (Water).
Identifiers: *Longshore currents, *Wave energy.

During 1962 fifteen beach stations were established along the Florida coast and monitored at monthly intervals. Observations of beach profiles, sediments, wave conditions, water characteristics and wind speed and direction were recorded. Techniques closely followed those of a nearly contemporaneous study on California beaches (Ingle, 1966). This made possible a comparison of beach conditions in a low- and medium-energy environment (Florida) with a high-energy environment (California). Average wave conditions in Florida range from low ripples in the low-energy eastern segment near Keaton Beach, to over 30 cm wave height along the broad arc from Cape San Blas to the Alabama-Mississippi peridelta region. Maximum wave heights reach 100 cm and more along the Pensacola shore and approach the average condition for high-energy beaches. Longshore current velocities, however, are surprisingly constant and range from 30 to 150 cm/sec in the general area. The much larger waves of the California coast produce essentially the same range of current velocities. This is a function of the increase in dimensions of a surf zone as larger waves necessarily break farther offshore, thus the

larger amount of water moved in translation is balanced by the increased area. Statistical studies of the sediment textural parameters confirm the observations of Schiffman (1965) regarding the greater variation in texture occurring in the swash zone than in other parts of the beach system. Net sand transport is to the west and apparently is actively prograding the large spits of the area from Mobile Bay to Pensacola. Wave energy decreases west of Mississippi Sound and transport diminishes. (Sinha - OEIS)
W74-03437

TABASCO BEACH-RIDGE PLAIN: AN ERODING COAST,
Florida State Univ., Tallahassee. Dept. of Geology.
W. F. Tanner, and F. W. Stapor.
Transactions Gulf Coast Association of Geological Societies, Vol 21, p 231-232, October 1971. 1 fig, 4 ref.

Descriptors: *Beaches, *Erosion, Shallow water, Littoral, History, *Mexico, Coasts.
Identifiers: *Tabasco (Mex), Beach-ridges.

The beach-ridge plain in the State of Tabasco, Mexico, is undergoing erosion today. It has not been growing for at least 50 years, and perhaps for as long as several centuries. Ten lines of evidence, including some severe limiting dates, substantiate this analysis. The large number of beach ridges, however, provides that, prior to the present epoch, there was a long interval of growth. The area has gone through a late Holocene history having 2 main parts: (1) a littoral economy of abundance of sand, during which the beach-ridge plain was built; and, (2) a littoral economy of scarcity of sand, during which the edge of the plain has been attacked by erosion. This history coincides with that of other beach-ridge plains in North and South America. The equilibrium beaches of the world have undergone a shift in the last few centuries, or are now undergoing a shift, from dominant deposition to dominant erosion. The problem of essentially world-wide coastal erosion is, therefore, getting worse. (Sinha-OEIS)
W74-03441

THE COASTAL SHOALS OF WESTERN CUBA AND THEIR DEPOSITS,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
For primary bibliographic entry see Field 02L.
W74-03443

ORBITAL VELOCITY ASSOCIATED WITH WAVE ACTION NEAR THE BREAKER ZONE,
Scripps Institution of Oceanography, La Jolla, Calif.
D. L. Inman, and N. Nasu.
Corps of Engineers Beach Erosion Board Technical Memorandum No 79, March 1956. 72 p, 40 fig, 4 tab, 18 ref, 2 append. DA49-055-eng-3.

Descriptors: *Sediment transport, *Beach erosion, *Waves (Water), *Coasts, Shallow water, *California.
Identifiers: *Breaker zone, *Solitary waves, Orbital velocity, Water depth.

The orbital velocity associated with ocean surface waves in shallow water was measured for various wave conditions at La Jolla, California, as part of a program of study of sand transport and beach erosion. The measurements were made near the bottom and just seaward of the breaker zone in water depths ranging from about five to fifteen feet and for wave heights as great as seven and one-half feet. The current measuring device consisted essentially of a cylindrical rod fixed rigidly at one end like a cantilever, and the system was so arranged that the orbital velocity could be interpreted from the bending of the rod caused by the force exerted by the moving water. Orbital velocity and wave pressure were recorded simultaneously for time intervals of about twenty minutes. The observed maximum horizontal velocities compare favorably with velocities predicted from solitary wave theory for most waves with simple profiles when the ratio of the wave height to water depth is greater than about 0.4. The agreement with theory is somewhat better for longer period waves, and in some cases is still quite good in regions where the ratio of wave height to water depth is less than about 0.2. On the average, the onshore velocity associated with the passage of a wave crest was greater in magnitude and of shorter duration than the offshore velocity under the wave trough. The differences in crest and trough velocities varied from wave to wave, but in general correlated with the shape of the waves. (Sinha-OEIS)
W74-03444

SEASONAL VARIATIONS IN BEACH PROFILES ALONG THE OUTER BANKS OF NORTH CAROLINA,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
R. Dolan.
Shore and Beach, Vol 33, No 2, p 22-26, October 1965. 4 fig, 1 tab, 2 photos. Nonr 1575 (03).

Descriptors: *Beaches, *Waves (Water), *Tidal effects, Profiles, Seasonal, *Berms, Energy, *North Carolina.
Identifiers: Outer Banks (NC), Bodie Island (NC), *Surf zone, *Littoral currents, Swell, Wave action.

During the past three years the Coastal Studies Institute of Louisiana State University has conducted a series of detailed beach-process experiments on the Outer Banks of North Carolina. These studies were undertaken to investigate relationships between surf-zone processes and the sedimentary and morphologic characteristics of a natural beach. Specifically, continuous measurements over a six-month period were made of beach sand levels, wave properties, tidal action, and littoral currents. The Bodie Island beaches respond inversely to the hydraulic forces of wave action. Higher waves with shorter periods are associated with reduction in beach 'thickness' and slopes, and lower waves with longer periods result in thicker and steeper beaches. December through February is the season of highest beach variability. This is indicated by the wide range of maximum-minimum values and in the wave data. The waves were higher than 5 feet for 25 per cent of the time and had shorter periods. March and April are months of relatively high energy equilibrium, and the May profile approaches typical berm. It seems probably that a profile similar to that of May will extend into the summer with little change. It may be concluded, therefore, that the beaches of coastal North Carolina are cyclic in nature, building seaward during summer and retreating in response to winter conditions. (Sinha-OEIS)
W74-03446

THE POSSIBILITY OF CALCULATING THE SAND DRIFT ALONG A SHALLOW-WATER COASTT. II. DEFINITION OF THE BASIC CONCEPTS AND TERMS AND FORMULATION OF THE PROBLEM OF DETERMINING THE DRIFT,
V. V. Longinov.
Oceanology, Vol 5, No 3, p 69-76, May 1966. 3 fig, 4 ref.

Descriptors: *Sediment transport, *Littoral drift, *Discharge (Water), Erosion, Deposition (Sediments), *Coasts, *Shallow water.
Identifiers: Near shore.

The term drift is applied to the continuous movement of material in the same direction. The existence of a single drift or a sequence of drifts has as its results the ultimate displacement of material through some section of the nearshore zone. The main differential characteristic of the drift is its discharge. The first step in determination of discharge is to clarify the function that relates discharge to the characteristics of the force flux. Such a function should include dependence on these characteristics of the intensity of erosion and the rate of transport of erosion products along the coast. The first relationship (for erosion) should, in its turn, contain two functions--the dependence of transverse or normal erosion defined by the p sub x function, and the dependence of erosion on the longshore component of the flux. The next stage should be to clarify the structure of the flow that determines the discharge. By the accepted terminology the concept of flow structure includes the structure of the discharge and its kinematic structure and material composition. The structure of the discharge may be expressed, for example, by the relationship between the discharge of suspended matter and the total discharge or it may be a more differentiated characteristic, in relation to the detail attempted in describing the movement of material in the flow and to the requirements and conditions of the problem. Material composition may be described in the form of the dependence of the ordinary lithological characteristics of the material on the coordinates. (Sinha-OEIS)
W74-03447

FALLING WATER LEVEL RIPPLE MARKS,
Florida State Univ., Tallahassee. Dept. of Geology.
For primary bibliographic entry see Field 02L.
W74-03449

THE COASTAL ENVIRONMENT OF NEW ENGLAND,
Geological Survey, Woods Hole, Mass.
For primary bibliographic entry see Field 02L.
W74-03453

WATER WAVES FROM UNDERWATER EXPLOSIONS IN SHALLOW WATER, PART I: A MATHEMATICAL MODEL FOR WAVES IN CONSTANT DEPTH AND IN SHOALING WATER,
Naval Civil Engineering Lab., Port Hueneme, Calif.
For primary bibliographic entry see Field 02L.
W74-03454

THE EFFECT OF CURRENTS ON THE MASS TRANSPORT OF PROGRESSIVE WATER WAVES,
National Engineering Science Co., McLean, Va.
For primary bibliographic entry see Field 02L.
W74-03455

CONDITIONS OF BEACH RETROGRESSION IN A LOW-ENERGY ENVIRONMENT,
Florida State Univ., Tallahassee.
D. A. Warnke.
Zeitschrift fur Geomorphologie, Vol 11, No 1, p 47-61, March 1967. 7 fig, 3 tab, 13 ref.

Descriptors: *Coasts, *Beach erosion, *Florida, *Storms, *Hurricanes, *Storm surges, Meteorology, Environmental effects.
Identifiers: Low-energy environments, Breaker heights, Beach retrogression, Air-sea interaction.

During repeated surveys of several sites on Alligator Spit in the Big Bend area of Florida, it became apparent that the beach was rapidly retrograding. This seemed anomalous because the area of Alligator Spit had been classified by Tanner (1960) as a low energy environment, defined by average annual breaker height of less than 10 cm. The rate of

retrogression of those beaches was in excess of 6m per year which was as great or greater, than those of many retrograding high energy beaches. This rate is considerably greater than postulated by Tanner (1964) for exposed beaches on nearby St. Vincent and St. George Islands, namely one meter per year. Because of this difference, it was decided to continue the surveys of one site, FSU No. 5, and to 'bracket' them as closely as possible around the occurrences of hurricanes. Such occurrences naturally seemed to accelerate erosion, but it was not known to what degree. It was also not known whether this beach loss was permanent or was compensated by prograding of the beach during times of quiescence. Rapid beach retrogression in a low energy environment is entirely possible, is not 'catastrophic' in a geologic sense, and is caused by air-sea interaction phenomena which are only partially understood and cannot be predicted accurately. Therefore, development of such beach areas should be discouraged until meteorologists and coastal engineers develop better methods for surge predictions and protection. (Sinha-OEIS)
W74-03456

EQUILIBRIUM BEACH PROFILE SCALE--MODEL RELATIONSHIP,
Tetra Tech, Inc., Pasadena, Calif.
E. K. Noda.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 98, No WW4, Proceedings paper 9367, p 511-528, November 1972. 8 fig, 1 tab, 14 ref, 2 append. DACW 72-70-C-0021.

Descriptors: *Coasts, *Beaches, *Profiles, *Equilibrium, *Model studies.
Identifiers: Similitude relations, Scale models.

The purpose was to develop a scale-model law from laboratory beach profiles assumed to be at equilibrium. Consideration is given to similitude relations and to possible coastal movable-bed model laws. Experimental data and analysis are presented. The model law has been derived from two-dimensional laboratory beach profile data and thus the extrapolation to three-dimensional models is still in question. Optimistically, this model should be applicable to prototype beaches which are reasonably approximated by two-dimensions. With scaling of the wavelength by the vertical scale the refraction pattern is preserved, which offers credibility to three-dimensional extrapolation, but the number of waves in the model when scaled to prototype dimensions will be smaller in proportion to the distortion. The region of interest was the beach profile in the breaker zone where the boundary conditions should be based on turbulent flow characteristics. The offshore zone boundary conditions are viscous dominated and thus are not compatible with those of the breaker zone. From a practical viewpoint the breaker zone is more important, and from the experimental results, the offshore boundary conditions do not affect the breaker zone beach profiles. (Sinha-OEIS)
W74-03457

BEACH CUSPS: RESPONSE TO PLATEAU'S RULE,
California Univ., Los Angeles. Dept. of Geology.
P. E. Cloud, Jr.
Science, Vol 154, No 3751, p 890-891, November 18, 1966. 1 fig, 8 ref.

Descriptors: *Topographic features, Beaches, *Sediments, *Waves (Water), Coasts, *Shallow water.
Identifiers: *Beach cusps, *Wave height.

Beach cusps familiar to many frequenters of shorelines, occur along beaches that lie parallel with the approaching wave train. Characteristically, they appear (in plain view) as a remarkably evenly spaced, linear array of symmetric sinusoidal or deltoidal 'horns,' or low mounds, of seaward-projecting sediment, separated by equally symmetric crescent-shaped depressions, concave toward the sea. The beach sediment is commonly coarser on the cusps than in the intervening depressions between them. Cusps develop during recession of the water level characteristically following storms, but also with falling tides. The all-too-few observations are consistent with but do not prove the hypothesis that beach cusps form in response to the nearly regular segmentation of the cylindrical wave form against the beach, as predicted from Plateau's rule, but with local complications due to hydrodynamic variations and beach regimen. If this hypothesis were true, the average spacing of beach cusps would reflect the height of the waves that produced (or is producing) them--a relation that, if it could be expressed more precisely, would contribute to the synoptic study of coastal conditions. (Sinha-OEIS)
W74-03460

DYNAMICS AND MORPHOLOGY OF THE SAMBIAN PENINSULA,
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
V. R. Boynagryan.
Oceanology, Vol 6, No 3, p 374-380, February 1967. 5 fig, 16 ref.

Descriptors: *Beach erosion, *Unconsolidated sediments, Coasts, Dunes, *Glacial drift, Erosion, Storms, *Storm surge, Landslides, Ice, *Topography.
Identifiers: *Baltic Sea (Sambian Peninsula), Slumping.

The Sambian Peninsula consists of a variety of unconsolidated deposits. The coasts are mainly Quaternary moraine loams and clays with sand lenses and sand, gravel and shingle deposits. In places, however, there are also outcrops of Tertiary sands and sandy clays. The outcrops of the moraine form prominences on the coast. Large and small boulders washed out of the moraine have formed accumulations at the cliff foot and on the submarine beach slope. Where unconsolidated and readily eroded Tertiary sands and sandy clays outcrop, gently flowing indentations of the coast have formed. An exception is provided by the large coastal prominence between Donskoye and Yantarnyy on the western coast of the Sambian Peninsula, which is apparently connected with the greatest height of the cliff and the lesser slope of the bottom than on adjacent stretches. There is an intimate connection between abrasion on the Sambian Peninsula and cyclonic activity. In years of intensive cyclonic activity the frequence and strength of the storms are both increased, and there are high storm surges. This reactivates the processes of coastal destruction and stimulates landslides and slumping. Considerable erosion was produced on the northern shores of the Sambian Peninsula in October 1963 by a force 6 northwesterly storm. The sands overlying the moraine around the mouths of the Aleyka and the Zabava were eroded for 5-6 m. A force 6 north and northeasterly storm in February 1962 accompanied by a 65- 70-cm surge, produced considerable destruction along the entire perimeter of the northern shores of the Sambian Peninsula. The destructive effect of the storm was intensified by the mechanical action of ice on the coast. (Sinha-OEIS)
W74-03462

FORCED FLOW PASSAGES IN KARST MASSIFS,
Genoa Univ. (Italy). Inst. of Geography.
G. Pasquini.
Transactions of the Cave Research Group of Great Britain, Vol 15, No 2, p 89-90, June 1973. 6 ref.

Descriptors: *Karst hydrology, *Erosion, Limestones, Water chemistry, Carbonates, Carbon dioxide, Groundwater movement, Caves, Springs.

A horizontal or a sloping karst gallery which is roughly circular in cross section and which maintains this outline for a clearly observable distance, is usually called a forced flow passage, meaning a passage formed by water under pressure progressively boring through the rock. This interpretation is usually incorrect, because an increase in the pressure of a mass of water within a karst massif leads to increase in the solubility of CO2, and hence reduces the amount of CO2 available to attack the surface of the rock; this should diminish rather than accentuate the erosive action. The forced flow or phreatic passages can be formed only in the upper part of the phreatic zone and, since these waters flow towards peripheral resurgences, only horizontal or moderately sloping passages can be formed. (Knapp-USGS)
W74-03513

SOME CALCULATIONS OF THE DENUDATION RATE IN A DOLOMITIC LIMESTONE AREA AT ISFJORD-RADIO, WEST-SPITZBERGEN,
Lund Univ. (Sweden). Dept. of Physical Geography.
U. Hellden.
Transactions of the Cave Research Group of Great Britain, Vol 15, No 2, p 81-87, June 1973. 4 fig, 1 tab, 20 ref.

Descriptors: *Erosion, *Karst, *Karst hydrology, *Erosion rates, Carbonate rocks, Arctic, Subsurface drainage.
Identifiers: Spitzbergen.

Corrosion analyses of karst were made at Isfjord-Radioa, West-Spitzbergen, in August 1972. To obtain the overall lowering rate, Corbel's formula, slightly modified by Williams, was used. The denudation rate was also obtained by calculating the water discharge and the chemical mass. The result of the analyses is an overall lowering rate of 11.3 mm/1000 years. (Knapp-USGS)
W74-03514

APPARATUS FOR AUTOMATIC CONTROL OF SEDIMENT LEVEL (PRIBOR DLYA AVTOMATICHESKOGO KONTROLYA UROVNYA OSADKA),
Ukrainski Nauchno-Issledovatelskii Institute Bumagi, Kiev (USSR).
For primary bibliographic entry see Field 05D.
W74-03541

RADIOISOTOPIC SAND TRACER STUDY POINT CONCEPTION, CALIFORNIA. PRELIMINARY REPORT ON ACCOMPLISHMENTS JULY 1966 - JUNE 1968,
Army Coastal Engineering Research Center, Washington, D.C.
D. B. Duane, and C. W. Judge.
Available from NTIS as AD-690 804, $6.00 in paper copy, $1.45 in microfiche. Miscellaneous Paper No. 2-69, May 1969. 201 p, 55 fig, 4 tab, 154 ref, 6 append. AEC AT (49-11)-2988.

Descriptors: *Sediment transport, *Tracers, *Radioactivity techniques, *Beach erosion, *California, Radiation, Tagging, Littoral, Computer programs.
Identifiers: Point Conception (Calif), *Nearshore processes, Xenon 133.

The purpose is to develop and use radioactive tracers for research in sand movement and littoral processes. Objectives include determination of suitable radioactive isotopes, development of radiation detectors, and development of handling and survey programs. Concurrent with these objectives, studies of sediment transport around the Point Conception headland and of the mechanics

of littoral transport are being conducted. Methods developed by this program have direct application to engineering design of such works as harbor development and beach erosion prevention, and quasi-military application such as the location of radioactive or other toxic materials. Sand grains indigenous to the study area have been labeled with xenon-133 which does not adversely affect the hydraulic properties of the sand. A mobile detector system using cesium iodide crystals and housed in a 'ball' towed behind an amphibious vehicle detects quantity and areas of radiation. Computer programs correct and plot radiation data. A field test of equipment and principles at Cape Kennedy, Florida, was successful. Additional field tests were at Surf and Point Conception, California. (Sinha-OEIS)
W74-03608

TOPOGRAPHIC CHANGES IN THE SURF ZONE PROFILE,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
C. J. Sonu, and R. J. Russel.
Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, Sept 1966, American Society of Civil Engineers, Vol 1, Part 2, Chap 31, p 502-524, 1967. 17 fig, 28 ref. Technical Report No. 50, Sept. 1966. Nonr-1575 (03).

Descriptors: Shores, Topography, *Waves (Water), *North Carolina, Profiles, *Beaches, *Shallow water.
Identifiers: *Surf zone, Nearshore, Outer Banks (NC).

The conventional method of dealing with relationships between wave action and topographic response on a beach is to reduce the problem to a two-dimensional scheme that regards basic processes as taking place in a vertical plane normal to the shoreline. This scheme is valid only if the waves arrive at right angles to the shore and the nearshore contours are reasonably straight and parallel the beach. As these conditions are not realized in many cases another analytical method is necessary - one that recognizes effects of other than normal wave arrival and systematic patterns of diversification in nearshore topography. This study, based on a long period of field investigation on the Outer Banks, North Carolina, examines a three-dimensional approach. Observations from a long pier were used to explain nearshore topographic diversification and resulted in conclusions that were confirmed by subsequent field observation. (Sinha-OEIS)
W74-03609

THE ROLE OF SHELL MATERIAL IN THE NATURAL SAND REPLENISHMENT CYCLE OF THE BEACH AND NEARSHORE AREA BETWEEN LAKE WORTH INLET AND THE MIAMI SHIP CHANNEL,
Miami Univ., Fla. Marine Lab.
For primary bibliographic entry see Field 02L.
W74-03610

BED FORMS GENERATED IN THE LABORATORY UNDER AN OSCILLATORY FLOW: ANALYTICAL AND EXPERIMENTAL STUDY,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 08B.
W74-03612

ON SINGULAR BOUNDARY VALUE PROBLEMS FOR THE EPD EQUATION,
Wisconsin Univ., Madison. Dept. of Mathematics.
For primary bibliographic entry see Field 02E.
W74-03617

PROCESSING AND ANALYSIS OF RADIOISOTOPIC SAND TRACER (RIST) STUDY DATA,
Oak Ridge National Lab., Tenn.
H. R. Brashear, E. H. Acree, F. N. Case, P. A. Turner, and D. B. Duane.
Available from NTIS as AD-732 608 for $3.00 paper copy, $1.45 microfiche. In: Proceedings of the Coastal Engineering Conference (12th), at Washington, D.C., September 1970, p 821-830, 1970. 7 fig.

Descriptors: *Tracers, *Radioisotopes, *Sediment transport, *Computer programs, *Littoral, *Coasts, Shallow water, *Beaches.
Identifiers: Nearshore processes.

Data collected during the Radioisotopic Sand Tracer (RIST) field tests are processed through digital computers. Data treatment requires computing and plotting the detector position and corresponding radiation count rates for radioactive decay. The field data are recorded on punched paper tape which is then edited and transferred to magnetic tape for input to data reduction programs. The navigation data, which are in the form of distances to shore-based microwave responder beacons, are tested for spurious values by comparison with the theoretical maximum travel distances of the survey vehicle between successive fixes. The navigation ranges are then converted to rectangular geographical coordinates. Present emphasis is in the development of computer programs to construct a count rate surface from data collected along track lines. This technique facilitates machine contouring and enables numerical integration of the count rate surface. The ultimate goal is to obtain an estimate of mean direction and volume of littoral transport and a radiation material balance to be used to check the results. Several programs required to accomplish these tasks are operating at the Coastal Engineering Research Center and the Oak Ridge National Laboratory. (Sinha - OEIS)
W74-03628

PROCEEDINGS OF TENTH CONFERENCE ON COASTAL ENGINEERING, TOKYO, JAPAN, SEPTEMBER, 1966, VOLUME I.
For primary bibliographic entry see Field 08B.
W74-03674

A PETROGRAPHIC STUDY ON LITTORAL DRIFT ALONG THE ISHIKAWA COAST, JAPAN,
Senshu Univ., Tokyo (Japan).
For primary bibliographic entry see Field 02L.
W74-03692

DEPOSITIONAL BEHAVIOR OF FINE SEDIMENT IN A TURBULENT FLUID MOTION,
Massachusetts Inst. of Tech., Cambridge. Hydrodynamics Lab.
E. Partheniades, and J. F. Kennedy.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 41, p 707-729, 1967. 14 fig, 12 ref.

Descriptors: Equilibrium, *Shear stress, *Suspended solids, *Flocculation, *Turbulence.
Identifiers: *Fluid flow.

An experimental investigation, utilizing an apparatus consisting of a counterrotating annular channel and ring, of the depositional characteristics of fine, cohesive sediment revealed that after an initial period of rapid deposition, the sediment concentration approaches asymptotically an equilibrium value. The ratio of this equilibrium concentration to the initial concentration is nearly independent of initial concentration and for a given sediment and environment depends only on the flow conditions. For the three water depths investigated, the ratio of equilibrium to initial concentration was found to be a single function of an average shear stress around the channel-section perimeter. A comparison of the size distributions of the parent material with the material retained in suspension when equilibrium was achieved indicated that the greatest losses occur in the clay-size fractions, suggesting that the deposition is controlled predominantly by flocculation, and that the strength and size of the flocs exert a stronger influence on the deposition than does the particle weight. A silty-clay sediment with a mean particle diameter of 0.0009 mm was used in all experiments. (See also W74-03674) (Sinha-OEIS)
W74-03697

MATHEMATICAL SIMULATION OF BOTTOM SEDIMENT MOTION BY WAVES,
National Research Council of Canada, Ottawa (Ontario). Hydraulics Section.
J. W. Kamphuis.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 44, p 766-789, 1967. 14 fig, 1 tab, 20 ref.

Descriptors: *Mathematical models, Bed load, *Waves (Water), *Sediment transport, Coasts, Equations, Hydraulics, *Bottom sediments.
Identifiers: Wave action.

A mathematical model may be constructed to simulate bottom sediment movement under waves. This model will necessarily be subject to much empiricism. Because of the large number of calculations made, each with its own errors, it is to be expected that the accuracy of the results is not very high. This study has shown however, that the accuracy is considerably better than a classical error study would tend to indicate. In any study of sediment motion a substantial scatter is to be expected due to the inherently statistical nature of the whole problem. It is thought, however, that in this study also a large proportion of the scatter may be due to an inadequate knowledge about velocities in the boundary layer and perhaps due to too many simplifying assumptions in the evaluation of the effective water velocity, the prime moving force. Until further research is performed in this area, it is of little value to extend the mathematical model to include bottom slope, ripple formation, etc, which is mathematically not too difficult. Thus the simulation of field conditions, although mathematically quite feasible, is, at present, beyond reach until the hydrodynamics of the boundary layer becomes more clear. (See also W74-03674) (Sinha-OEIS)
W74-03698

PROCEEDINGS OF TENTH CONFERENCE ON COASTAL ENGINEERING, TOKYO, JAPAN, SEPTEMBER, 1966. VOLUME II.
For primary bibliographic entry see Field 08B.
W74-03699

SHORE PROTECTION ON THE COAST OF 'YAIZU',
Fisheries Agency, Tokyo (Japan). Fishing Port Div.
For primary bibliographic entry see Field 08B.
W74-03700

CHARACTERISTICS OF SEDIMENTARY ENVIRONMENTS IN MORICHES BAY,
California Univ., Los Angeles.
For primary bibliographic entry see Field 02L.
W74-03707

DAMS AND BEACH-SAND SUPPLY IN SOUTHERN CALIFORNIA,
California Univ., Santa Barbara. Dept. of Geology.

R. M. Norris.
In: Papers in Marine Geology Shepard Commemorative Volume, 1964. (R. L. Miller, ed.) Chapter 9, p 154-171, 5 fig, 1 tab, 12 ref.

Descriptors: *California, *Beaches, *Dams, *Sedimentation, *Beach erosion, Rivers, Channelization, Streams, Flood control, Seasonal, Equilibrium, Drainage, Watersheds (Basins).

Construction of dams, flood-control channels, settling basins, and the like tend to intercept sand and prevent its reaching the beaches. The possibility of such long-term loss of beach-sand supply is discussed. In southern California, the beaches typically become flatter and thinner during the winter months, often resulting in the exposure of rocks along their inshore margins. In the summer months a change in profile develops with sand being moved inshore, covering the exposed rocks and producing a steeper profile. Three seasonal changes merely shift sand back and forth without adding to the volume of the beaches. That most beaches have not advanced steadily seaward, even when sand supplies were added periodically, suggests that in most cases a state of equilibrium has been reached in which sand normally delivered to the beaches by streams is more or less matched by losses to the land or to deep water. Many of the important sand-supplying streams in southern California are affected by dams. In the case of the Santa Ana River, 96.3 percent of the drainage basin is now blocked by the Prado Flood Control Dam. Man-made alterations of drainage basins include construction of concrete-lined channels which encourage rapid runoff of water but usually carry little sand. These channels often begin at the spillway of a flood-control dam or other structure that traps sediment. The concrete channel prevents erosion of the stream channel, and in this manner it may seal off sand supplies that would have eventually reached the beach under natural conditions. As stream development proceeds and floods are prevented from carrying large volumes of sand to the beaches, a slow but continuous shrinkage of the beaches is expected. (Sinha-OEIS)
W74-03708

A STUDY OF SEDIMENT DISTRIBUTION IN THE ZONE OF SHOALING WAVES OVER COMPLICATED BOTTOM TOPOGRAPHY,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
R. L. Miller, and J. M. Zeigler.
In: Papers in Marine Geology Shepard Commemorative Volume, 1964. (R. L. Miller, ed.) Chapter 8, p 133-153, 10 fig, 1 tab, 17 ref, 1 append. Also issued as Woods Hole Oceanographic Inst. Contrib. No. 1203.

Descriptors: Sedimentation, Shoals, Topography, *Sand spits, *Massachusetts, *Shallow water, *Waves (Water), *Sediment transport, Particle size.
Identifiers: *Shoaling waves, Bottom topography, Cape Cod (MA), Nearshore, Breaking waves.

This study advances a line of research concerning sediment distribution and its relationship to shoaling waves. The area chosen for the field work was on the east side of Cape Cod near Highland Light. A long submerged bar, Peaked Hill Bar, extends between Race Point and Highland. This bar is unusual in that it is not parallel to the coast but diagonal to it, being 1500 feet more or less offshore at the Race Point end and joining the shore about one-half mile northwest of Highland. The study area discussed covers the point where Peaked Hill Bar joins the beach. This area was chosen because it provided the desired complexity of nearshore topography, and higher waves. (Sinha-OEIS)
W74-03709

2K. Chemical Processes

NITROGEN, PHOSPORUS AND OTHER CHEMICALS IN SEDIMENTS FROM RESERVOIRS IN NORTH MISSISSIPPI,
Mississippi Univ., University.
For primary bibliographic entry see Field 05B.
W74-03213

A HYDROCHEMICAL DESCRIPTION OF MOUTHS OF RIVERS FLOWING INTO THE TSIMLYANSK RESERVOIR (GIDROKHIMICHESKAYA KHARAKTERISTIKA UST-'YEV REK, VPADAYUSHCHIKH V TSIMLYANSKOYE VODOKHRANILISCHE),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
A. S. Yakusheva, A. A. Zenin, and V. I. Rogozhkin.
In: Formirovaniye khimicheskogo sostava poverkhnostnykh vod i metody ikh analiza: Gidrokhimicheskiye Materialy, Vol 57, p 17-21, 1973. 3 fig, 2 tab, 2 ref.

Descriptors: *Water chemistry, *Reservoirs, *Rivers, *Tributaries, *Dissolved solids, Ions, Inorganic compounds, Hardness (Water), Color, Seasonal.
Identifiers: *USSR (Tsimlyansk Reservoir), *Mineralization.

Rivers flowing into the Tsimlyansk Reservoir in southeast Soviet Russia differ significantly in the quantity of dissolved material. Mineralization of right-bank tributaries varies between 120 and 1,600 mg/liter and mineralization of left-bank tributaries varies between 100 and 3,800 mg/liter. Mineralization of right-bank tributaries flowing into the reservoir is 2-3 times less than mineralization of left-bank tributaries. Right-bank tributaries are characterized by high concentrations of biogenic elements. Discharge of dissolved ions into the reservoir by right-bank tributaries is 70,000 to 340,000 metric tons, and discharge of dissolved ions into the reservoir by left-bank tributaries is 130,000 to 390,000 metric tons. Total tributary discharge of dissolved ions into the reservoir varies between 3% and 13% of the dissolved-ion discharge of the Don River in upper reaches of the reservoir. (Josefson-USGS)
W74-03252

SODIUM/POTASSIUM RATIO IN WATER OF THE DON RIVER (SOOTNOSHENIYE NATRIYA I KALIYA V VODE R. DONA),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
For primary bibliographic entry see Field 05B.
W74-03253

TRACE ELEMENTS IN BOTTOM SEDIMENTS OF DNIEPER RIVER RESERVOIRS (MIKROELEMENTY V DONNYKH OTLOZHENIYAKH VODOKHRANILISHCH R. DNEPRA),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
Ye. P. Nakhshina.
In: Formirovaniye khimicheskogo sostava poverkhnostnykh vod i metody ikh analiza: Gidrokhimicheskiye Materialy, Vol 57, p 30-38, 1973. 1 fig, 8 tab, 32 ref.

Descriptors: *Water chemistry, *Trace elements, *Bottom sediments, *Reservoirs, *Metals, Manganese, Zinc, Copper, Cobalt, *Organic matter, Correlation analysis, Pollutant identification.
Identifiers: *USSR (Dnieper River).

Bottom-sediment samples were collected in the Kiev, Kremenchug, Dneprodzerzhinsk, Dneproskoye imeni Lenina, and Kakhovka Reservoirs in August-September 1968 to determine Mn, Zn, Cu, and Co concentrations. The principal factor governing the concentration and distribution of trace elements in bottom sediments of Dnieper River reservoirs is organic-matter content. The coefficient of correlation between Mn and organic matter is +0.8, between Zn and organic matter--+0.96, between Cu and organic matter--+0.92, and between Co and organic matter--+0.90. A positive correlation exists between average values of all elements. The closest relation is observed for Cu-Co, followed by Zn-Co and Zn-Cu. The reliability of these relations is very high (>99%). Coefficients of correlation for Mn-Cu, Mn-Zn, and Mn-Co are somewhat lower. Bays and gulfs whose bottom sediments contain large amounts of organic matter are areas of high concentration of trace elements in all reservoirs. Concentrations of organic matter, Mn, Zn, Cu, and Co in bottom sediments of Dnieper River reservoirs are tabulated. (Josefson-USGS)
W74-03254

DISTRIBUTION PATTERNS OF ORGANIC MATTER IN RIVER WATERS OF THE WOODED TUNDRA ZONE (ZAKONOMERNOSTI RASPREDELENIYA ORGANICHESKOGO VESHCHESTVA RECHNYKH VOD LESOTUNDROVOY ZONY),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
M. P. Smirnov, and M. N. Tarasov.
In: Formirovaniye khimicheskogo sostava poverkhnostnykh vod i metody ikh analiza: Gidrokhimicheskiye Materialy, Vol 57, p 39-55, 1973. 6 fig, 3 tab, 11 ref.

Descriptors: *Water chemistry, *Organic matter, *Rivers, *Tundra, *Forests, Physiographic provinces, Hydrogen ion concentration, Color, Oxidation, Floods, Low flow, Water sampling.
Identifiers: USSR, Mineralization.

Analysis of organic-matter distribution in river waters in the wooded tundra zone of the USSR (covering about 1.5 million sq km) was based on determinations of permanganate oxidizability in 50 water samples from 3 points in the European part of the country and in 490 water samples from 37 points in the Asiatic part. The content of organic substances in river waters of the wooded tundra of European Russia is greater than that of Asiatic Russia. Differences in the values of the ratios of organic substances to mineral substances decrease. River waters in the wooded tundra zone of Asiatic Russia are more highly mineralized. Total mineralization of river waters in the wooded tundra zone is 42% higher than in the tundra zone of the USSR. The quantity of organic substances in river waters of the two zones is practically the same. The ratios of organic substances to mineral substances in waters of the wooded tundra zone decrease during low flows. (Josefson-USGS)
W74-03255

HYDROCHEMICAL DESCRIPTION AND CALCIUM-CARBONATE EQUILIBRIUM OF SHUMAK CARBONATE WATERS (GIDROKHIMICHESKAYA KHARAKTERISTIKA I KARBONATNO-KAL'TSIYEVOYE RAVNOVESIYE SHUMAKSKIKH UGLEKISLYKH VOD),
Irkutskii Gosudarstvennyi Universitet (USSR).
N. A. Selina, V. M. Levchenko, and G. M. Shpeyzer.
In: Formirovaniye khimicheskogo sostava poverkhnostnykh vod i metody ikh analiza: Gidrokhimicheskiye Materialy, Vol 57, p 123-133, 1973. 5 fig, 4 tab, 20 ref.

Descriptors: *Water chemistry, *Water quality, *Inorganic compounds, *Calcium carbonate, *Equilibrium, Carbon dioxide, Travertine, Trace elements, Water temperature, Oxidation-reduction potential, Hydrogen ion concentration, Hard-

ness (Water), Springs, Mineral water, Water analysis, Chemical analysis, Water sampling.
Identifiers: *USSR (Shumak River), Mineralization.

The chemical composition of Shumak carbonate waters in Eastern Sayan (Buryat ASSR) is of the calcium-magnesium bicarbonate type, and their mineralization varies between 0.91 g/liter and 2.50 g/liter. Concentrations of HC03, Mg, S04, and Na+K2 increase with increasing mineralization. Processes participating in formation of the chemical composition of waters of Shumak springs include solution of carbonates and sulfates and oxidation of sulfides in the presence of a large amount of carbon dioxide. All Shumak waters are supersaturated by CaC03, as a result of which travertine forms at the point of discharge of springs at the surface. Results of a chemical analysis of samples of Shumak carbonate waters collected on June 30, 1970, and characteristics of calcium-carbonate equilibrium of Shumak mineral waters in June 1970 are tabulated. (Josefson-USGS)
W74-03256

CHANGES IN CHEMISTRY OF NATURAL WATERS OF CULTIVATED LANDS (IZMENENIYA KHIMIZMA PRIRODNYKH VOD KUL'TURNYKH LANDSHAFTOV),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 05B.
W74-03257

ROLE OF PRESENT-DAY WATERS IN THE KARSTIFICATION OF CARBONATE ROCKS ON THE CRIMEAN LOWLAND (ROL' SOVREMENNYKH VOD V ZAKARSTOVANII KARBONATNYKH POROD RAVNINNOGO KRYMA),
V. P. Meleshin.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 3, p 84-88, May-June 1973. 1 fig, 2 tab, 18 ref.

Descriptors: *Karst, *Karst hydrology, *Carbonate rocks, Calcium carbonate, Aqueous solutions, Solubility, Equilibrium, Precipitation (Atmospheric), Saline lakes.
Identifiers: *USSR (Crimean Lowland), Mineralization, Karst forms.

Atmospheric precipitation is the most active agent in present-day karstification of carbonate rocks on the Crimean Lowland. Floodwater and sea water have a much lesser corrosive effect. Solubility of CaCO3 in highly mineralized solutions of saline lakes depends on the concentration of salts, their quantitative ratio, and on presence of calcium sulfates. Besides generally accepted methods of determining carbonate capacity of natural waters, the method of theoretical computation of calcium-carbonate equilibrium can be used. (Josefson-USGS)
W74-03258

DETERMINATION OF FATTY ACID COMPOSITION BY GAS CHROMATOGRAPHY: I. ANALYSIS WITH USE OF THERMAL CONDUCTIVITY DETECTOR,
Japan Oil Chemist Society, Tokyo. Gas Chromatography Committee.
S. Watanabe, S. Hayano, T. Akiya, K. Mimura, and H. Nakasato.
Journal of the American Oil Chemists' Society, Vol 50, No 9, p 357-359, September 1973. 3 tab, 4 ref.

Descriptors: *Gas chromatography, Statistical methods, Data processing, Methodology.
Identifiers: *Standard methods, Collaborative studies, Accuracy, *Fatty acids.

Gas chromatographs with thermal detectors were used by a collaborative study team to carry out replicate analyses of fatty acids for the purpose of establishing standard methods. Statistical methods were used to determine: (1) the relationship between operating conditions of the equipment and deviation from real values or scattering of data, (2) whether the difficulty in making peak measurements accounted for scattering of values, (3) the effect of enlarging peak size by adjusting attenuator range or chart speed, and (4) the effect of using response correction factors. From the results of the four collaborative works it was found that deviation of analytical values from exact composition and interlaboratory scattering of data may be considerably decreased by the following means: (1) enlarging the size of narrow peaks (less than 5 mm at a half height) or peaks with low height by adjusting the attenuator range or chart speed; (2) correcting the analytical values by using correction factors determined from analysis of known mixtures having composition similar to that of an unknown sample. (See also W74-03312) (Little-Battelle)
W74-03311

DETERMINATION OF FATTY ACID COMPOSITION BY GAS CHROMATOGRAPHY: II. ANALYSIS WITH USE OF FLAME IONIZATION DETECTOR,
Japan Oil Chemist Society, Tokyo. Gas Chromatography Committee.
S. Watanabe, S. Nakasato, S. Hayano, H. Kuwamura, and T. Nagai.
Journal of the American Oil Chemists' Society, Vol 50, No 9, p 360-363, September 1973. 4 tab, 6 ref.

Descriptors: *Gas chromatography, Statistical methods, Methodology.
Identifiers: *Fatty acids, *Collaborative studies, *Sample size, Interlaboratory tests, Accuracy.

Gas chromatographs with flame ionization detectors were used in collaborative analyses of known mixtures of four or five fatty acid methyl esters. The resulting data were treated statistically to examine the inter - and intralaboratory scatter and the effect of using correction factors. Average values in some cases did not approach actual values even when only data with small deviations were accepted. In some laboratories a sort of regularity was observed in the deviation of analytical values from real values throughout the analyses of four samples. The application of correction factors to the analytical values obtained by these laboratories resulted in a considerable decrease of interlaboratory scattering and deviation from the real values. When a constant amount of sample was injected, intralaboratory scattering was decreased, whereas interlaboratory scattering was not. Injection of large sample sizes caused deviation. From this collaborative study it was recommended that 0.5-1.0 microliter of 20 percent solution be injected. (See also W74-03311) (Little-Battelle)
W74-03312

GEOCHEMICAL HYDROLOGY OF THE BATON ROUGE AQUIFERS,
Louisiana State Univ., Baton Rouge. School of Geoscience.
For primary bibliographic entry see Field 04B.
W74-03335

TRACE-ELEMENT DISTRIBUTION IN THE CONTINENTAL-SHELF SEDIMENTS OFF THE EAST COAST OF INDIA,
Andhra Univ., Waltair (India). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-03350

OXYGEN AND CARBON ISOTOPE COMPOSITIONS OF ALTERED CARBONATES FROM THE WESTERN PACIFIC, CORE 53.0, DEEP SEA DRILLING PROJECT,
Illinois Univ., Urbana. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-03352

AN EVALUATION OF WATER-QUALITY DATA OBTAINED AT FOUR STREAMFLOW DAILY-RECORD STATIONS IN IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 05A.
W74-03507

SATURATED CALCITE SOLUTIONS FROM 10 TO 40 DEG C: A THEORETICAL STUDY EVALUATING THE SOLUBILITY PRODUCT AND OTHER CONSTANTS,
R. G. Picknett.
Transactions of the Cave Research Group of Great Britain, Vol 15, No 2, p 67-80, June 1973. 8 fig, 6 tab, 30 ref, append.

Descriptors: *Water chemistry, *Calcite, *Solubility, *Saturation, Aqueous solutions, Chemical properties.
Identifiers: Solubility product.

Theoretical evaluations of ion concentrations in limestone solution, necessary for the understanding of such basic processes as rates of solution and deposition, can only be made if values for all equilibrium constants are known. Published experimental pH data for saturated calcite solutions were used to derive values for the following constants: the solubility product of calcite; the constant for equilibrium between CaHCO3, Ca and HCO3; and the constant for equilibrium between CaCO3, Ca and CO3. The results, covering the temperature range 10 deg to 40 deg C, are compared with other published values and are tested by comparing the theoretically predicted properties of saturated calcite solutions with published experimental data. The properties of calcite solutions can be predicted with moderate accuracy for concentrations up to 550 ppm in the temperature range 10-40 deg C. (Knapp-USGS)
W74-03525

INVESTIGATION OF THE CHEMICAL COMPOSITION OF ATMOSPHERIC PRECIPITATION IN THE VICINITY OF YEVPATORIYA (ISSLEDOVANIYE KHIMICHESKOGO SOSTAVA ATMOSFERNYKH OSADKOV V RAYONE G. YEVPATORII),
L. I. Larionova.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materially, Vol 53, p 3-9, 1972. 4 tab, 16 ref.

Descriptors: *Water chemistry, *Water analysis, *Chemical analysis, *Chemistry of precipitation, *Precipitation (Atmospheric), Inorganic compounds, Salts, Halogens, Ions, Winds, Meteorology, Water sampling, Seasonal.
Identifiers: *USSR (Yevpatoriya), Mineralization.

Mineralization of atmospheric precipitation collected near Yevpatoriya on the Crimean west coast varies widely, between 45.62 and 680.07 mg/liter. The maximum amount of salts in precipitation occurs in March and December and the minimum amount in May and July. Most precipitation samples are rich in calcium and are the least mineralized. Mineralization is highest in precipitation samples which are rich in calcium sulfate. A relation was established between ion concentration in precipitation and wind direction. The quantity of salts supplied by precipitation to Lake Bol'shoye Moynakskoye near the Yevpatoriya health resort is 96.4 metric tons. Average salt concentration is 161.73 mg/liter. Results of chemical analyses of 24 precipitation samples collected at the Yevpatoriya station in March 1964-February 1965 are tabulated. (Josefson-USGS)
W74-03526

CHEMICAL COMPOSITION OF WATER IN AGRAKHANSKIY BAY (O KHIMICHESKOM SOSTAVE VODY AGRAKHANSKOGO ZALIVA),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
Yu. I. Volovik, and A. A. Zenin.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 10-16, 1972. 1 fig, 4 tab, 3 ref.

Descriptors: *Water chemistry, *Water analysis, *Chemical analysis, Inorganic compounds, Water properties, Color, Hydrogen ion concentration, Gases, Organic matter, Seasonal, Water sampling.
Identifiers: *Dagestan ASSR, *USSR (Agrakhanskiy Bay), Mineralization.

The northern and southern parts of Agrakhanskiy Bay in Dagestan ASSR differ in hydrologic and hydrochemical regimes. The chemical composition of water in the northern part at Chakannyy village and in the southern part at Novaya Kosa village was investigated to determine its suitability for fish culture. Mineralization of water in the northern part varied between 349 and 635 mg/liter, and mineralization of water in the southern part in summer varied between 500 and 600 mg/liter. The content of biogenic substances in the northern part was sufficiently high during all seasons, while the content of biogenic substances in the southern part in summer dropped to zero. Permanganate oxidizability in water of the northern part varied between 6.2 and 17.9 mg of oxygen/liter, reaching the maximum value in summer. Permanganate oxidizability in water of the southern part was 26.5-30.2 mg of oxygen/liter. The gas composition of water in the northern part during all seasons of the year was favorable to organism activity. The oxygen content varied between 6.50 and 10.87 mg/liter. The gas regime in the southern part was less favorable to living organisms, promoting annual summer eutrophication. Results of chemical analyses of water in the northern part in 1964-65 and in the southern part in 1964 are tabulated. (Josefson-USGS)
W74-03527

CHARACTER OF SEASONAL DISTRIBUTION OF MINERALIZATION OF WATER IN THE TSIMLYANSK RESERVOIR (O KHARAKTERE SEZONNOGO RASPREDELENIYA MINERALIZATSII VODY TSIMLYANSKOGO VODOKHRANILISHCHA),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
V. I. Rogozhkin, A. A. Zenin, A. S. Yakusheva, and L. T. Pavelko.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 17-20, 1972. 1 fig, 6 ref.

Descriptors: *Water chemistry, *Reservoirs, *Distribution patterns, *Seasonal, Variability, Fluctuations, Surveys.
Identifiers: *USSR, *Tsimlyansk Reservoir, *Mineralization.

Seasonal changes in mineralization of water in the Tsimlyansk Reservoir in southeast Soviet Russia were investigated in hydrochemical surveys conducted by the Novocherkassk Hydrochemical Institute in 1967-68. Three clearly expressed patterns were observed in the seasonal variability of mineralization along the longitudinal axis of the reservoir. In spring, mineralization increased from the upper to the lower part of the reservoir (from 270 to 400 mg/liter). In May-June, mineralization decreased from the upper to the middle part (from 470 to 300 mg/liter) and increased in the lower part (to 370-380 mg/liter). For the remainder of the year, mineralization decreased in the direction of the dam. Annual hydrologic characteristics affect only the range of fluctuations of mineralization and not the character of its seasonal change in a reservoir. (Josefson-USGS)
W74-03528

MINERALIZATION AND IONIC COMPOSITION OF ICE IN SOME WATER BODIES OF THE NORTHERN CAUCASUS (O REZHIME MINERALIZATSII I IONNOGO SOSTAVA L'DA NEKOTORYKH VODOYEMOV SEVERNOGO KAVKAZA),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
I. M. Korenovskaya, and M. N. Tarasov.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 21-32, 1972. 6 fig, 4 tab, 11 ref.

Descriptors: *Water chemistry, *Ions, Ice, *Ice cover, *Ponds, Inorganic compounds, Air temperature, Winter, Water sampling.
Identifiers: *USSR (Northern Caucasus), *Mineralization.

Hydrochemical characteristics of ice and of water on the underside of ice were investigated for three ponds in the Northern Caucasus in the winters of 1964-65, 1966-67, and 1967-68. Mineralization of ice is closely associated with its growth. By the end of complete ice cover, mineralization of ice in different years had dropped by a factor of 2-6. Mineralization of ice averaged 2%-22% of the mineralization of water under ice. Despite temporal changes in mineralization of ice, its relative chemical composition remained almost the same and was similar to the composition of water under ice. (Josefson-USGS)
W74-03529

MICROELEMENT CONTENT AND REGIME IN WATER AND SUSPENDED SOLIDS IN THE VOLGA RIVER BASIN (SODERZHANIYE I REZHIM MIKROELEMENTOV V VODE I VO VZVESHENNYKH VESHCHESTVAKH V BASSEYNE R. VOLGI),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
G. S. Konovalov, and A. A. Ivanova.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 60-70, 1972. 7 fig, 27 ref.

Descriptors: *Water chemistry, *Trace elements, *Dissolved solids, *Suspended solids, *Metals, Manganese, Nickel, Cobalt, Copper, Zinc, Molybdenum, Lead, Floods, Low flow, Water sampling.
Identifiers: *USSR (Volga River), Vanadium, Tin, Silver.

Concentrations of V, Mn, Ni, Co, Cu, Zn, Mo, Sn, Ag, Pb, and Bi were determined in water and suspended-solids samples collected at 43 points on the Volga River and its major tributaries and reservoirs during spring floods and summer low flows in 1962-63. The Volga River basin is characterized by generally low concentrations of most of these microelements in solution and in suspended solids. Distribution of Ni, Cu, and Zn in solution and of Zn, Mo, Ag, and Pb in suspended solids is relatively uniform throughout the river basin. Increased concentrations of dissolved V and of Cu and Sn in suspended solids are observed in downstream reaches of the Volga. Concentrations of Mn and Mo in suspended solids and of V, Mn, and Ni in solution in Volga River water decrease from excessively wet forested lands, where the pH of surface waters and groundwater is low, to the dry steppes and semideserts, where the pH of surface waters is higher. Concentrations of Mn, Ni, and Zn in solution and of Ag in suspended solids are generally higher during floods than during periods of low flow. (Josefson-USGS)
W74-03533

DISTRIBUTION AND CHARACTERISTICS OF ORGANIC MATTER IN RIVER WATERS OF THE TUNDRA ZONE (RASPREDELENIYE I OSOBENNOSTI ORGANICHESKIKH VESHCHESTV RECHNYKH VOD TUNDROVOY ZONY),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
M. P. Smirnov.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 71-85, 1972. 7 fig, 3 tab, 17 ref.

Descriptors: *Water chemistry, *Organic matter, *Rivers, *Tundra, Physiographic provinces, Hydrogen ion concentration, Color, Oxidation, Floods, Low flow, Water sampling, Seasonal.
Identifiers: USSR, Mineralization.

Analysis of organic-matter distribution and composition in river waters in the tundra zone of the USSR (covering almost 1.5 million sq km) was based on determinations of permanganate oxidizability in 700 water samples from 42 points in the European part of the country and in 140 water samples from 11 points in the Asiatic part. Total mineralization of water in European rivers is lower than that in Asiatic rivers. Reaction of tundra waters of Asiatic rivers is neutral and that of European rivers is more acidic. Concentrations of colored and readily oxidizable compounds leached from soil and vegetation are higher in organic matter of Asiatic tundra waters than in organic matter of European tundra waters. Ratios of permanganate and bichromate oxidizability are noticeably smaller for European tundra waters than for Asiatic tundra waters, except during winter low flow when they are almost the same. The average long-term value of these ratios for river waters of the tundra zone is 46%. Average long-term ratios of organic substances to mineral substances in river waters of the tundra zone are 45%. In the Asiatic part these ratios are somewhat smaller than in the European part. During floods these ratios are larger in rivers of Asiatic tundras; during other seasons these ratios are larger in rivers of European tundras. (Josefson-USGS)
W74-03534

TITRIMETRIC DETERMINATION OF URANIUM WITH ELECTROGENERATED VANADIUM (V),
New Brunswick Lab. (AEC), N.J.
C. G. Goldbeck, and M. W. Lerner.
Analytical Chemistry, Vol 44, No 3, p 594-596, March 1972. 1 tab, 4 ref.

Descriptors: *Volumetric analysis, Aqueous solutions, Automation, *Electrodes, Reduction (Chemical), Ions, Iron, Oxidation, *Electrochemistry.
Identifiers: *Uranium, Vanadium, Coulometric titration, Gold sheet, *Electrogeneration, Potentiometric titration, Precision, Ion selective electrodes, Gauze electrodes, Platinum.

The Davies and Gray method of determining uranium involves reduction to uranium (IV) by iron (II) in a phosphoric acid medium, oxidation of excess iron (II) with nitric acid and molybdate catalyst, and titration of the diluted solution with potassium dichromate to a barium diphenylamine sulfonate end point. This method has been modified by titration with electrogenerated vanadium (V). Using a platinum gauze electrode, the mean current efficiency of vanadium (V) obtained at densities of 0.05-1.6 mA/cm squared was 99.97 plus or minus 0.05 percent. With the expanded gold sheet electrode, essentially the same mean value was obtained in the density range of 0.11-3.3 mA/cm squared. End point potentials in titrating uranium in pure solution and in solutions of mixtures were nearly constant at 570 mV versus SCE. A series of nine determinations with 80-120 mg of uranium using the platinum-gauze generating anode showed a relative standard deviation of 0.062 percent and a relative difference of minus 0.023 plus or minus 0.048 percent (95 percent confidence limits). The same samples were analyzed by the New Brunswick Lab dichromate procedure, and the results agreed very closely with those for coulometric titration. The proposed procedure has little advantage over the manual dichromate titration other than dispensing with the buret and preparation of the standard titrant and

substitution of simpler time read-out for the volume readtout. Also the stability of V (III) requires that the coulometric titrations be completed within seven minutes. (Holoman-Battelle)
W74-03564

A MULTIPLE SPECIFIC ION DETECTOR AND ANALOG DATA PROCESSOR FOR A GAS CHROMATOGRAPH QUADRUPOLE MASS SPECTROMETER SYSTEM,
California Univ., Los Angeles. Dept. of Pharmacology.
D. J. Jenden, and R. W. Silverman.
Journal of Chromatographic Science, Vol 11, No 11, p 601-606, November 1973. 6 fig, 2 tab, 21 ref.

Descriptors: *Mass spectrometry, *Gas chromatography, *Computer programs, Analog computers, Data processing.
Identifiers: Ion detectors, Recorders, GC-Mass spectrometry.

A system is described which allows a quadrupole mass spectrometer to be used as an 8-channel multiple specific ion detector for a gas chromatograph. Eight separate outputs are provided, each of which may be tuned to any mass peak within the range of the mass spectrometer. Scaling and zero bucking controls are provided on each channel. An analog data processor allows up to four sets of linear combinations to be calculated from the outputs, which may thus be made specific for isotopic variants rather than nominal masses. A set of semi-automatic peak integrators allows ion currents for eight masses to be separately integrated over a chromatographic peak, using only a single channel recorder to monitor the peak. A usable mass spectrum may be obtained in this way from 1 ng of a compound when a reference spectrum is available for comparison. (Mortland-Battelle)
W74-03580

COMPARISON OF FIELD AND SIGMA-INDUCTIVE MODELS FOR THE TRANSMISSION OF NONCONJUGATIVE SUBSTITUENT EFFECTS. THE 2,6-SPIRO (3,3) HEPTYL SYSTEM,
Georgia Inst. of Tech. Atlanta. School of Chemistry.
C. L. Liotta, W. F. Fisher, and G. H. Greene.
Chemical Communications p 1251-1252, 1969. 1 fig, 2 tab, 6 ref. OWRR B-049-GA (7) 14-31-0001-3269.

Descriptors: *Aqueous solutions, *Acids, Chemicals, *Organic acids, Acid-base equilibrium.
Identifiers: Kirkwood-Westheimer model, *Ethanol.

The pKa values of a series of 6-substituted spiro (3,3) heptane-2-carboxylic acids have been measured in 50% (by weight) aqueous ethanol and the results analysed in terms of the mechanism of transmission of nonconjugative substituent effects.
W74-03737

THERMODYNAMICS OF ACID-BASE EQUILIBRIA. M' AND P' HYDROXYBENZALDEHYDE,
Georgia Inst. of Tech. Atlanta. School of Chemistry.
C. L. Liotta, K. H. Leavell, and D. F. Smith, Jr.
Journal of Physical Chemistry, Vol 71, No 9, p 3091-3092, August 1967. 3 tab, 11 ref. OWRR B-049-GA (6). 14-31-0001-3269.

Descriptors: Thermodynamics, *Phenols, *Ionization, Acidity, *Acid-base equilibrium.
Identifiers: *Hydroxybenzaldehyde, Solute-solvent interaction.

The p (K sub a)'s of m and p hydroxybenzaldehyde have been measured from 14-56C in water. From these data the delta H and delta S of ionization were calculated. The results were analyzed in terms of solute-solvent interaction mechanisms.
W74-03738

GLASS TRANSITION WITH NEGATIVE CHANGE IN EXPANSION COEFFICIENT,
Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
For primary bibliographic entry see Field 01B.
W74-03741

2L. Estuaries

UNDERGROUND STORAGE AND RETRIEVAL OF FRESH WATER FROM A BRACKISH--WATER AQUIFER,
Geological Survey, Norfolk, Va.
For primary bibliographic entry see Field 04B.
W74-03237

BROWN SEAWEED AS AN INDICATOR OF HEAVY METALS IN ESTUARIES IN SOUTH--WEST ENGLAND,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 05C.
W74-03301

THE ZOSTERA EPIFAUNAL COMMUNITY IN THE YORK RIVER, VIRGINIA,
Florida Atlantic Univ., Boca Baton. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W74-03302

LARVAE OF THE BURROWING SHRIMP, UPOGEBIA AFFINIS, (CRUSTACEA, DECAPODA, UPOGEBIIDAE) FROM VIRGINIA PLANKTON,
Virginia Inst. of Marine Science, Gloucester Point.
P. A. Sandifer.
Chesapeake Science, Vol 14, No 2, p 98-104, June 1973. 4 fig, 13 ref.

Descriptors: *Larval growth stage, *Zooplankton, *Chesapeake Bay, Crustaceans, Invertebrates, Estuarine environment, Marine animals, Larvae, Shrimp, Plankton, Estuaries, Sampling, Speciation, Virginia.
Identifiers: *Upogebia affinis, *York River, *Zoeae, Animal morphology, Burrowing shrimp, Decapods, Clarke-Bumpus Quantitative Plankton sampler.

Four zoeal stages of Upogebia affinis taken in plankton samples from the York River estuary and adjacent lower Chesapeake Bay, Virginia, are described and figured. Upogebia affinis zoeae may be identified readily in plankton samples. Distinguishing characteristics include an unarmed carapace and rostrum in all stages, the shape and spination of the telson, and the flattened appearance of the endopodites of the pereiopods in late stages. (Holoman-Battelle)
W74-03303

STANDING CROP OF SALT MARSHES SURROUNDING CHINCOTEAGUE BAY, MARYLAND-VIRGINIA,
Maryland Univ., Solomons. Natural Resources Inst.
C. W. Keefe, and W. R. Boynton.
Chesapeake Science, Vol 14, No 2, p 117-123, June 1973. 1 fig, 3 tab, 28 ref.

Descriptors: *Standing crops, *Salt marshes, Tidal marshes, Organic matter, Chemical analysis, Marsh plants, Plant tissues, Phosphorus, Potassium, Vegetation, Carbon, Nitrogen, Calcium, Magnesium, Biomass, Estuarine environment, Virginia, Maryland.
Identifiers: *Chemical composition, *Marsh grasses, *Chincoteague Bay, Sample preparation, Species abundance, Spartina alterniflora, Dry ashing, Distichlis spicata, Marine environment.

Chincoteague Bay is surrounded by approximately 95 sq km (23,000 acres) of irregularly flooded salt marsh dominated by short Spartina alterniflora. The maximum standing crop, chemical composition, and live:dead ratio of the marsh grasses were estimated from samples taken at 20 marsh stations in August, 1970. Samples consisting of all the aerial plant parts were taken from a total of 20 sites. Plant parts lying on the ground and no longer attached to the plant were also included in the sample. The samples were oven-dried to constant weight at 100C, and the estimated weight of plant material per sq m at each station was determined. To obtain weights of organic material, the samples were ground, charred, and burned at 550C until the ash weight remained constant. Ash-free dry weight was then determined as the difference between the weight of the ash and the weight of the subsample. The pulverized samples were analyzed for C, N, P, K, Ca, and Mg. Live standing crop ranged from 427 to 558 g dry matter/sq m and 335 to 470 g organic matter/sq m. The total standing crop of live plants consisted of 48 million kg of dry material of which 39 million kg was organic material. Chemical analysis indicated that phosphorus and potassium were rapidly leached from the dead plants while magnesium tended to be retained. Live:dead ratios ranged from 0.9 to 2.3 and were lower than those found in regularly flooded marshes. (Holoman-Battelle)
W74-03304

MORTALITY OF MARKET-SIZED OYSTERS (CRASSOSTREA VIRGINICA) IN THE VICINITY OF A DREDGING OPERATION,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 05C.
W74-03305

MUD SHRIMP (CALLIANASSA) LARVAE (CRUSTACEA, DECAPODA, CALLIANASSIDAE) FROM VIRGINIA PLANKTON,
Virginia Inst. of Marine Science, Gloucester Point.
P. A. Sandifer.
Chesapeake Science, Vol 14, No 3, p 149-159, September 1973. 7 fig, 14 ref.

Descriptors: *Zooplankton, *Chesapeake Bay, *Larval growth stage, Crustaceans, Invertebrates, Ecological distribution, Estuarine environment, Shrimp, Larvae, Plankton, Speciation, Sampling, Estuaries.
Identifiers: *Mud shrimp, *Zoeae, Animal morphology, Sample preservation, Decapods, Callianassa biformis, Callianassa atlantica, Bongo sampler, Clarke-Bumpus sampler.

Larval stages attributed to three species of Callianassa (designated as spp. A, B and C) taken in plankton samples from the lower Chesapeake Bay are described and figured. Evidence concerning tentative identification of spp. A and B is discussed, and it is suggested that these larvae may be ascribed to Callianassa biformis and Callianassa atlantica, respectively. (Holoman-Battelle)
W74-03307

INVESTIGATION OF THE PUBLIC AND PRIVATE INTERESTS IN THE CHESAPEAKE BAY AREA,
Maryland Univ., College Park. Dept. of Agricultural and Extension Education.
For primary bibliographic entry see Field 06B.
W74-03332

TIDAL INLETS FOR PRESERVATION OF ESTUARIES,
Lockwood, Andrews and Newnam, Inc., Houston, Tex.
M. G. Lockwood, and H. P. Carother.
Conference reprint available from ASCE, 345 E. 47th St., New York, N.Y. for $0.50 paper copy. In: ASCE Environmental Engineering Conference, Dallas, Texas, February 6-9, 1967. Conference Preprint 415, 33p. Also in: Journal of the Waterways and Harbors Division, American Society of Civil Engineers, Vol 93, No WW4, p 133-152, Nov. 1967. 12 fig, 2 ref, 1 append.

Descriptors: *Texas, *Estuaries, *Sediment transport, Barrier islands, *Inlets (Waterways), Pollution, Recreation, *Engineering structures, Mixing, Environmental control, Fisheries, Fresh water, Salinity, *Water pollution control.
Identifiers: Flushing.

A basic proposition of the Texas Water Plan is to use gulf waters as much as possible to preserve bay and estuary environments, thereby minimizing needs for fresh water. The complex problems involved in the design and building of balance tidal inlets to allow free inflow of adequate gulf water are reviewed from the standpoint of coastal engineering and tidal hydraulics. Environmental controls include use of inlets to both increase and decrease salinity, aid circulation and mixing of the waters, and provide sufficient tidal flushing to help the estuary assimilate treated return flows. Concepts of typical inlet design, including the sediment transport aspects, water and salinity balance, and tidal process, are presented. Misuse of imbalanced inlets is demonstrated by extreme values of tractive force. The astonishing magnitude of value of these estuaries for recreation, and sport and commercial fishing clearly establishes the necessity to save these aspects of the bays and estuaries. Reason dictates that scientific use must be made of balanced tidal inlets along this coast. (Sinha-OEIS)
W74-03342

NUMERICAL CALCULATION OF WAVE REFRACTION DIGITAL COMPUTER,
Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
For primary bibliographic entry see Field 08B.
W74-03343

EFFECTS OF PARTICLE SIZE AND WAVE STATE ON GRAIN DISPERSION,
Chicago Univ., Ill. Dept. of Geophysical Sciences.
S. P. Murray.
Available from NTIS as AD-643 824, for $6.00 paper copy, $1.45 microfiche. Ph D dissertation, June 1966. 87 p, 20 fig, 5 tab, 53 ref. Nonr-2121 (26), NR 388-074.

Descriptors: *Massachusetts, *Waves (Water), *Sediment transport, Hydrodynamics, Shallow water, Coasts, Beaches, *Particle size, *Dispersion.
Identifiers: *Buzzards Bay (Mass).

The dispersion of three sizes of tagged grains normal to the shoreline by shoaling wind waves was studied in Buzzards Bay, Massachusetts. Experiments were restricted to periods during which wave crests approached parallel to the shoreline. Determination of the frequency of tagged grains in samples taken from the bottom lead to the construction of concentration maps. Analysis of the concentration maps yielded a value of an index of net movement for each grain size in each experiment. The maximum horizontal velocity under the wave crest near the bottom was computed from measurements of wave geometry and water depth. Within the experimental range of the data it is concluded that under the same wave conditions, finer grain sizes have a greater tendency to move offshore than coarser grains. A change in wave state resulting in an increase in the maximum horizontal velocity near the bottom produces an increase in the tendency for all test grain sizes to move seaward. Theoretical concentrations computed from the equations of turbulent diffusion of contaminant particles in the atmosphere agree qualitatively with the empirical observations of this study and help to explain them. (Sinha-OEIS)
W74-03344

RECENT COASTAL SEDIMENTATION: CENTRAL LOUISIANA COAST,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
J. M. Coleman.
Louisiana State University Press, Coastal Studies Series No. 17, 1966. 73 p, 27 fig, 8 tab, 62 ref, $2.50. Nonr 1575 (03).

Descriptors: *Louisiana, *Sedimentation, *Coasts, Sea level, *Deltas, Marshes, Swamps, Bays, Stratigraphy, Reefs, *Shallow water, Mudflats, *Sediment distribution.

The Recent near-surface sediments of Vermilion, Iberia, and St. Mary Parishes, Louisiana, may be divided into two types: those sediments which were deposited by now abandoned Mississippi River distributaries and those carried along shore and deposited at the delta margin. The oldest recognizable Recent Mississippi River delta, the Maringouin or Sale-Cypremort, was actively depositing sediments in this region approximately 4600 years ago. During its development, quantities of fine-grained sediment were swept westward by longshore currents beyond the limits of the delta proper, blanketing the adjacent coast. Resulting mudflats caused coastal progradation, the dominant process of the marginal deltaic area. Immediately following the formation of mudflats, encroachment by salt-tolerant marsh vegetation began, and the process of blanket coastal peat formation was initiated. Later, a change in delta position caused a decrease in longshore sediment supply, and regional subsidence became dominant. Subsequent shoreline retreat under wave attack resulted in the formation of local beach ridges that were later stranded by another influx of sediments. Several similar cycles of sedimentation, marsh development, and beach-ridge formation are found in the shallow subsurface. These cycles can be correlated with various changes in the Mississippi River delta position. (Sinha-OEIS)
W74-03345

PRELIMINARY REPORT ON THE HYDROGRAPHY OF THE PENSACOLA BAY ESTUARY, FLORIDA,
Florida Dept. of Natural Resources, St. Petersburg. Marine Research Lab.
R. M. Gallagher.
Special Scientific Report No 29, November 1971. 36 p, 5 fig, 8 tab, 5 ref.

Descriptors: *Florida, *Estuaries, *Meteorology, Rainfall, Runoff, Salinity, Temperature, Dissolved oxygen, *Hydrography, *Stratification, *Bays, Data, Hydrogen ion concentration, Monitoring.
Identifiers: Pensacola Estuary (Fla).

Temperature, salinity, dissolved oxygen, and pH were monitored from September through December 1970 in the Pensacola Estuary, Florida. Temperatures ranged from 12.3 to 32.0C, salinities from 0.0 to 34.5 o/oo. These values did not fluctuate beyond those normally expected in respect to meteorological influences. Dissolved oxygen values at the surface were generally saturated but bottom values during September were generally below 58% of saturation in Escambia Bay, probably because of increased slainity stratification during periods of higher rainfall runoff and elevated temperatures. Analyses of pH values (which approached oceanic conditions except near river mouths) were inconclusive. (Sinha-OEIS)
W74-03347

MATHEMATICAL SIMULATION OF TIDAL TIME-AVERAGES OF SALINITY AND VELOCITY PROFILES IN ESTUARIES,
Massachusetts Inst. of Tech., Cambridge.
J. S. Fisher, J. D. Ditmars, and A. T. Ippen.
Available from NTIS, Springfield, Va, 22151, as COM-73-10053, for $3.00 paper copy, $1.45 microfiche. Sea Grant Publication Report No MITSG 72-11, Index No 72-311-Ccb, July 1972. 193 p, 40 fig, 21 tab, 27 ref, 3 append. SG GH-88, SG 2 35150.

Descriptors: *Estuaries, *Mathematical models, *Saline intrusion, Equations, Shoals, *River flow, Salinity, Model studies.
Identifiers: Velocity profiles, Freshwater discharge.

A mathematical model is developed using analytical techniques to determine the longitudinal and vertical distributions of velocities and salinities, averaged over a tidal period, for mixed but partially stratified estuaries. The flow field is assumed laterally homogeneous and the estuary width and depth are assumed to be functions of the longitudinal coordinate only. Required inputs to the model include the salt intrusion length, the ocean boundary salinity, the distribution of the depth-averaged salinity and the freshwater discharge. The governing equations included in the model are the vertical and longitudinal equations of motion, continuity, salt conservation and an equation of state. The key assumption is that the longitudinal salinity gradient is independent of depth. This decouples these equations and thus permits an analytical solution to be found. Using data from laboratory flume tests from the U.S. Army Waterways Experiment Station and the Delft Hydraulics Laboratory, and field surveys from the James River Estuary, the model solutions are used to find correlations for the mean vertical transfer coefficients of mass and momentum with gross characteristics of the estuary. These correlations, plus the results from a one-dimensional numerical model, permit this analytical model to be used as a predictor of the velocity and salinity profiles in estuaries and to relate changes in freshwater discharge to possible changes in the location of shoaling zones. (Sinha-OEIS)
W74-03348

STRUCTURE AND TEXTURE OF A GRAVELLY BARRIER ISLAND IN THE FITZROY ESTUARY, WESTERN AUSTRALIA, AND THE ROLE OF MANGROVES IN THE SHORE DYNAMICS,
Australian National Univ., Canberra. Dept. of Biogeography and Geomorphology.
J. N. Jennings, and R. J. Coventry.
Marine Geology, Vol 15, No 3, p 145-167, October 1973. 10 fig, 1 tab, 56 ref.

Descriptors: *Gravels, *Sand bars, *Barrier islands, *Sedimentary structures, Stratification, Stratigraphy, Beaches, *Australia, Mangrove swamps, Erosion, Beach erosion, Sediment transport, Sedimentation, Estuaries.

In the stratification of a coarse-textured barrier island on Point Torment peninsula, King Sound, Australia, foreslope beds due to swash-backwash on the beach face are less important than the main units, which are steeply dipping backslope beds and topslope beds of gently, chiefly landward inclination. Their bimodal sediments are poorly sorted for wave-build features. A very coarse mode usually at -1.5 to -2 phi belongs to a population of well-rounded but platy, impure limestone, of local source, whereas the fine mode, almost invariably 1.00 to 1.25 phi, represents a population of quartz sand fed from low to subtidal estuarine shoals. The two populations derive from the surface creep and saltation components of traction carpets. Swash of intermediate energy waves

forms the topslope beds through percolation. Washover by waves generated by hurricanes erodes the top of the feature and deposits the backslope beds on the rear face in standing water. In both, unidirectional currents produce sediments with resemblances to fluvial traction deposits. The seaward mangrove swamps neither protect the embankments behind nor suffer seriously from the waves. (Knapp-USGS)
W74-03351

ARTIFICIAL RECHARGE OF COASTAL-PLAIN AQUIFER IN ISRAEL,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Div. of Hydrology.
For primary bibliographic entry see Field 04B.
W74-03356

CHARACTER AND STABILITY OF A NATURAL TIDAL INLET,
Army Coastal Engineering Research Center, Washington, D.C.
C. Mason, and R. M. Sorensen.
Reprint No 10-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 42, p 781-800, 1972. 13 fig, 2 tab, 12 ref.

Descriptors: *Barrier islands, *Beaches, *Inlets (Waterways), Coastal engineering, Beach erosion, Storms, Surges, Tidal effects, Littoral drift, Sedimentation, Waves (Water), Currents (Water), *Texas.
Identifiers: *Matagorda Bay (Tex).

Brown Cedar Cut, a natural unstable barrier beach inlet connecting East Matagorda Bay, Texas, with the Gulf of Mexico, was studied to determine the physical and hydraulic properties of the inlet, and to investigate the inlet's historical stability, as well as its short-term response to a number of physical processes. Hurricanes and continuing erosion of adjacent beaches enhance the long-term stability of the inlet. During winter months, the rapid passage of strong frontal systems and associated winds, as well as substantial amounts of rainfall, are primarily responsible for the day-to-day viability of the channel boundaries. In the absence of such forces, the predominance of littoral drift over the limited flushing ability of tidal currents leads to degradation of the inlet channel and westward migration of the entire inlet system. (Knapp-USGS)
W74-03365

CASE HISTORY OF MISSION BAY INLET, SAN DIEGO, CALIFORNIA,
Moffat and Nichols, Long Beach, Calif.
For primary bibliographic entry see Field 08B.
W74-03366

THE DRAFT UNITED NATIONS CONVENTION ON THE INTERNATIONAL SEABED AREA - AMERICAN BAR ASSOCIATION POSITION,
American Bar Association, Washington, D.C. Natural Resources Law Section.
For primary bibliographic entry see Field 06E.
W74-03377

CALIFORNIA COASTAL ZONE CONSERVATION ACT, INTERIM PERMIT CONTROL, GENERAL,
University of Southern California, Los Angeles.
For primary bibliographic entry see Field 06F.
W74-03379

THE NATION'S ESTUARIES: SAN FRANCISCO BAY AND DELTA, CALIFORNIA.
For primary bibliographic entry see Field 05G.
W74-03420

BEACH CHANGES, ON THE CENTRAL TEXAS COAST ASSOCIATED WITH HURRICANE FERN, SEPTEMBER, 1971,
Western Michigan Univ., Kalamazoo. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-03433

TIDAL RESONANCE IN THE BAY OF FUNDY AND GULF OF MAINE,
Dalhousie Univ., Halifax (Nova Scotia). Inst. of Oceanography.
C. Garrett.
Nature, Vol 238, No 5365, p 441-443, August 25, 1972. 2 fig, 2 tab, 18 ref.

Descriptors: *Bays, *Estuaries, Electrical powerplants, *Tidal effects, *Resonance.
Identifiers: *Bay of Fundy, *Gulf of Maine, Tidal amplitude.

Tidal ratios outside and inside the Bay of Fundy/Gulf of Maine system fall into two distinct groups. The period of the free mode oscillation in the bay is 13.3 h, and this is forced by the lunar M sub 2 tide of the North Atlantic to produce the unusually high tides recorded in the area. The tides in the Bay of Fundy are probably the highest in the world, with a range occasionally greater than 50 foot at places in Minas Basin at the head of the bay. Information is presented on tidal ratios, response function, resonant frequency, and frictional damping for a mixture of tides. Construction of barriers in the upper part of the Bay of Fundy for the generation of electrical power would change the tidal amplitude at any point in the Bay. (Sinha - OEIS)
W74-03434

THE OLD COASTLINE OF THE WASH,
Hydraulics Research Station, Wallingford (England).
F. J. T. Kestner.
New Scientist, Vol 15, No 303, p 516-519, September 6, 1962. 7 fig.

Descriptors: *Estuaries, *Erosion, *Sedimentation, Tidal effects, Slope, *Mud flats, *Tidal marshes.
Identifiers: Tidal range, *Wash (England), England East Coast, Tidal flats, Great Britain.

The Hydraulics Research Station of the Dept. of Scientific and Industrial Research has been carrying out field studies in The Wash (east coast of England) as part of a wider program of research dealing with the transport of sand and silts and the processes of accretion and erosion in estuaries. The Wash is a typical example of the large scale changes which can occur when man interferes with the natural balancing mechanism. A theory is presented, explaining the way in which estuaries tend to maintain themselves in balance by a complicated interaction of various accretional and erosional processes. In all estuaries there is a continual movement of sand and silt to and fro on each tide, the sand moving on the bed and the finer material travelling quite long distances in suspension and settling out at slack water. Every estuary tends to build up a pattern of banks and channels such that these movements upstream and downstream are in balance. Sometimes this may be a stable configuration, so that no changes at all appear to occur; more commonly, it is a cyclic pattern of shifting sandbanks and mud flats which build up and are periodically cut down again. This pattern repeats itself over a period of months or years, and there is no long-term progressive deterioration in the estuary. The particular pattern in any estuary is limited by various factors, the most important of which are the tidal range and bed slope and any permanent natural or artificial boundaries to the flow of the tide. Where a highly mobile suspended load is present the balance in an estuary is much more delicately poised and more easily disturbed. (Sinha - OEIS)
W74-03435

SIZE DISTRIBUTIONS OF THE SUSPENDED PARTICLES OF THE CHESAPEAKE BAY TURBIDITY MAXIMUM,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. R. Schubel.
Netherlands Journal of Sea Research, Vol 4, No 3, p 283-309, 1969. 11 fig, 3 tab, 9 ref.

Descriptors: *Chesapeake Bay, *Estuaries, *Turbidity, *Sediments, Suspended load, Particle size, *Tidal effects.
Identifiers: Suspended sediments, Scour and fill.

An intensive investigation of the Chesapeake Bay's turbidity maximum has shown that its suspended particle population is determined by the physical processes, local resuspension and the net non-tidal estuarine circulation, which combine to produce the turbid zone; and that the suspended particles have a narrow size distribution both in terms of equivalent projected diameters and Stokes' diameters or settling velocity ('size') distributions by a sedimentation technique. The suspended particle population of the Chesapeake Bay's turbid zone is composed of two sub-populations. One sub-population is comprised of particles with settling velocities of the same order as the vertical mixing velocities. These particles form a 'natural background' of suspended sediment found throughout the water column and whose concentration and particle size distribution are very uniform over periods of weeks or months. The second sub-population consists of particles which are alternately suspended and deposited. The presence of this sub-population is made manifest by semi-tidal fluctuations of the concentration of suspended sediment in the lower layer at stations deeper than about 4 m and throughout the water column at shallower stations. The fluctuations produced by tidal 'scour and fill' are accompanied by marked changes in the volume-size distribution and increase in magnitude near the bottom - the sediment source. (Sinha - OEIS)
W74-03436

DYNAMIC CHARACTERISTICS OF WEST FLORIDA GULF COAST BEACHES,
University of Southern California, Los Angeles. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-03437

WATER MOVEMENTS IN SHALLOW COASTAL BAYS AND ESTUARIES,
Miami Univ., Fla. Sea Grant Institutional Program.
T. N. Lee, and C. Rooth.
Coastal Zone Management Bulletin Series No. 3, January 1973. 19 p, 6 fig, 2 ref. SG 2-35147, AEC (AT (40-1)-3801-4).

Descriptors: *Estuaries, Coasts, *Bays, Ecology, Hydrology, Water pollution, Runoff, *Tides, *Mixing, *Shallow water, *Florida.
Identifiers: Exchange processes, Nearshore.

A modular approach for understanding estuarine water movements is presented. Estuarine exchange processes are typically controlled by the forces of tides, winds, river run-off, evaporation and precipitation. These forces display large variations in time and space between different estuaries and within any given estuary due to the geographic locations and complexities of shapes. The modular approach separates an estuary into characteristic regions. The building blocks consist of regions of direct exchange between an estuary and the coastal waters, interior basins, the regions of exchange between basins, and the region of river influence. The emphasis in this paper is on mixing processes within the interior of estuaries. (Sinha-OEIS)
W74-03442

THE COASTAL SHOALS OF WESTERN CUBA AND THEIR DEPOSITS,
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
V. P. Zenkovich.
Oceanology, Vol 9, No 2, p 207-221, December 1969. 8 fig, 19 ref.

Descriptors: Coasts, *Shoals, *Algae, Calcium carbonate, *Mangrove swamps, Peat, Mud, Coral, *Shallow water, *Sand bars, Sands, Topography.
Identifiers: *Cuba, Halimeda, Ooliths, Bottom topography.

Coastal surveys were made during the 1965 Soviet-Cuban expedition. Forty-seven cores were taken with a vibrating piston tube from the shoals of Cuba. In many places (to a depth of 13 m) the tube penetrated superficial deposits indicative of recent subsidence of the region. Dominant in recent shoal sand are calcareous flakes of the alga Halimeda and chemically precipitated calcium carbonate. The latter also forms viscous mud. Ooliths are now accumulating along the south edge of Los Canarreos Archipelago. The deposits at the edge of mangrove forests show peat seams as much as 1 m thick. Strong, surging, tidal and seasonal currents develop on all shoals. They are creating a ridged bottom in both sand and mud deposits. In Guacanayabo Bay there are some very complex, lithified ridges overgrown by corals. It is assumed that they are preserved mud ridges. (Sinha-OEIS)
W74-03443

THE SPECTRAL STRUCTURE OF WAVES IN THE NEARSHORE ZONE,
G. G. Kuz'minskaya.
Oceanology, Vol 5, No 3, p 14-17, 1965. 2 fig, 1 tab, 5 ref.

Descriptors: *Waves (Water), *Shallow water, Harbors.
Identifiers: *Nearshore, *Wave spectrum.

Spectral functions in the nearshore zone differ considerably from those in deep water. Owing to refraction the difference between the directions of propagation of individual components is reduced. In order to study the deformation of the wave spectrum in the nearshore zone the deepwater spectrum was divided into a number of components, for which wave lengths and propagation directions were different. The information obtained made it possible to determine the changes undergone by the components of the wave spectrum in the nearshore zone. In this connection it is of interest to compare the deformation of long and short waves of the spectrum in shallow water. In practice the period spectrum may be disregarded when determining wave height in shallow water, and it is sufficient to consider the function of the angular distribution of energy. This will not suffice to yield the wave periods, for which the frequency spectrum must also be known. When calculation of wave height in the nearshore zone is reduced to examination of the deformation of components that differ only in direction, the volume of calculation is significantly reduced without loss of accuracy. Further investigations will make it possible to determine how many components are needed for a given area. It is essential to reduce the volume of calculations, since it is still not known precisely how many components need to be considered: theoretically the number could be infinite. It may be possible to employ only three components in a calculation. (Sinha-OEIS)
W74-03448

FALLING WATER LEVEL RIPPLE MARKS,
Florida State Univ., Tallahassee. Dept. of Geology.
W. F. Tanner.
Transactions Gulf Coast Association of Geological Societies, Vol 12, p 295-301, 1962. 4 fig, 10 ref.

Descriptors: *Shallow water, *Ripple marks, *Waves (Water), *Currents (Water).
Identifiers: *Tidal flats, *Wave action, Near shore.

Ripple marks produced in shallow water, especially when the water level is falling, are more varied, more complex, more easily interpreted, and more valuable in paleogeographic studies than ripple marks developed under other conditions. Shallow-water and falling water-level ripple marks are conveniently studied on sand-floored tidal flats as well as in wave tanks. Tidal flats have the advantage that a variety of wave systems, moving from different directions, can be studied, both singly and in combination. Flat-topped ripple marks, in many different patterns, are formed when the water level drops to, or below, the ripple mark crests. When the rate of water level fall varies systematically, terraced flat-topped ripple marks are produced. Two parallel ripple mark systems, having smaller ridges centered in the troughs between larger ridges, develop as a result of the adjustment of wave orbit diameters during the fall. Helical cell ridges ('rib-and furrow'), windrow ridges, and other long down-current ridges are produced primarily by direct current flow, or by a vector combination of waves and currents, in shallow water. Composite ripple marks arise when the motions of two in-phase wave systems are added vectorially. Out-of-phase combination yields a wavy map pattern. Additional ripple mark types found on the tidal flat or in very shallow water have sharply-pointed troughs and gently rounded crests, or are flat-bottomed despite an abundance of sand. These types may be caused by a combination of wave action and mass flow of shallow water. (Sinha-OEIS)
W74-03449

THE RESPONSE OF NARROW-MOUTHED HARBORS IN A STRAIGHT COASTLINE TO PERIODIC INCIDENT WAVES,
Harvard Univ., Cambridge, Mass. Dept. of Mechanical Engineering.
G. F. Carrier, R. P. Shaw, and M. Miyata.
Transactions of the ASME, Journal of Applied Mechanics p 335-344, June 1971. 12 fig, 6 ref.

Descriptors: *Harbors, *Waves (Water), *Shallow water, *Coasts, Tsunamis, Resonance.
Identifiers: *Incident waves.

The response to low-frequency periodic plane incident waves of a harbor connected by a narrow channel to the open sea is studied using linearized, constant depth, shallow water wave theory. Particular attention is paid to those frequencies close to the natural frequencies of the harbor basin and to those critical incident frequencies at which a maximum response is found. The theory developed is applicable as long as the width of the channel, and therefore, the harbor entrance is small compared to the incident wave length and to the characteristic dimensions of the harbor basin. Significant amplifications are found at certain incident wavelengths which do not necessarily correspond to the natural frequencies of the harbor basin and a peculiar effect of the length of the entrance channel on the magnitude of the amplification; values of these critical incident wavelengths are noted. (Sinha-OEIS)
W74-03450

THE GENERATION OF EDGE WAVES BY CYLINDRICAL WAVES IMPINGING FROM THE OUTER SEA,
Tohoku Univ., Sendai (Japan). Geophysical Inst.
For primary bibliographic entry see Field 02E.
W74-03451

THE COASTAL ENVIRONMENT OF NEW ENGLAND,
Geological Survey, Woods Hole, Mass.
R. H. Meade.
Woods Hole Oceanographic Institution Contribution No 2496, 1971. 47 p, 16 fig, 96 ref.

Descriptors: *Coasts, *Estuaries, Surface waters, *Water circulation, Salinity, *Sediments, Minerals, Bibliographies, *New England.
Identifiers: Glacial ice, Moraine.

This view of the New England coastal environment focuses on three subjects: the shape of the coastline, the coastal waters, and the coastal sediments. It covers the nonliving aspects of the environment to set the scene within which and with which man and other organisms interact. A guide to sources of further information is included. (Sinha-OEIS)
W74-03453

WATER WAVES FROM UNDERWATER EXPLOSIONS IN SHALLOW WATER, PART I: A MATHEMATICAL MODEL FOR WAVES IN CONSTANT DEPTH AND IN SHOALING WATER,
Naval Civil Engineering Lab., Port Hueneme, Calif.
H. Wang.
Available from NTIS as AD-684 473, for $6.00 paper copy, $1.45 microfiche. Report No NCEL-TN-824, April 1966. 38 p, 13 fig, 6 ref.

Descriptors: *Explosions, *Shallow water, Beaches, *Seiches, Gravity waves, Coastal structures, *Mathematical models, *Waves (Water), *Energy transfer.
Identifiers: Wave propagation, Underwater explosions.

A technique is provided for the theoretical prediction of the characteristics of the surface gravity water waves generated by an explosion in nearshore shallow water as the waves propagate over a flat bottom and up a sloping beach. It provides the excitation information required to predict the loading--pressures and forces--by such waves on waterfront structures located on the beach. The explosion is simulated by a time-dependent initial disturbance uniformly distributed from the free surface to the bottom. The resulting water motion is assumed to be symmetric about an axis through the center of disturbance. First, the problem of wave propagation is treated by the application and potential theory with appropriate linearized boundary conditions. A closed-form asymptotic solution of surface variations is developed for an exponentially decaying initial disturbance. Next, the problem of wave amplification in shoaling water is considered under the assumption that the energy transfer is constant across any cylindrical surface. Results are compared with measurements made in the wave basin of the U. S. Naval Civil Engineering Laboratory. (Sinha-OEIS)
W74-03454

THE EFFECT OF CURRENTS ON THE MASS TRANSPORT OF PROGRESSIVE WATER WAVES,
National Engineering Science Co., McLean, Va.
J. I. Collins.
Journal of Geophysical Research, Vol 69, No 6, p 1051-1056, March 15, 1964. 9 fig, 5 ref. ONR Nonr 4177 (00).

Descriptors: *Sediment transport, *Currents (Water), Gravity waves, *Waves (Water), Dye dispersion.
Identifiers: *Mass transport, *Progressive gravity waves, Near shore, Particle velocity.

The pickup velocity of water offshore of the breaking zone is dominated by the particle orbital velocities of the waves near the bed, whereas the rate of transportation of fine material is dominated by mass-transport effects. The effects of even very small currents on the mass transport of waves could be very large. Results are given of some experimental work on waves with very small su-

perimposed collinear currents. The mass-transport velocities and currents cannot be added algebraically. A theory is developed which is based on the algebraic addition of the particle velocities in the boundary layer at the bed, assuming laminar motion. The agreement between theory and experiment is found to be quite good for small wave heights; it is better for larger wave heights with shorter wave periods than with longer wave periods. (Sinha-OEIS)
W74-03455

MIXING AND CIRCULATION IN GAUTAMI-GODAVARI ESTUARY,
Andhra Univ., Waltair (India). Dept. of Zoology.
P. N. Ganapati, and D. V. Rama Sarma.
Current Science, Vol 34, No 22, p 631-632, November 20, 1965. 1 fig, 13 ref.

Descriptors: *Estuaries, *Circulation, *Mixing, *Salinity, Fresh water, Halocline, *Tidal effects, Seasonal.
Identifiers: *India (Godavari Estuary), Cellular circulation, Flushing.

The distribution of salinity in relation to the depth and distance has been studied during the years 1958-62 in the Gautami branch of the Godavari estuary, the second largest in the country. The absence of vertical differences in salinity in the lower estuary during the hot weather season suggests operation of a 'cellular type' of circulation as observed by Rochford in the typical tidal eastern Australian systems. The vertical homogeneity in the dissolved oxygen and nutrient concentrations also lend support to the possible occurrence of a 'cullular type' of circulation. Under the influence of the tides these bodies of water move back and forth, each about a mean position. During the early phase of the annual flood period a rapid seaward displacement of these 'cells' of water occurs. When the river runs into high spates the pattern of cellular circulation becomes disrupted and the estuary becomes filled with freshwater at all levels. (Sinha-OEIS)
W74-03459

PHYSIOLOGICAL ASPECTS OF ANIMAL LIFE IN ESTUARIES WITH SPECIAL REFERENCE TO SALINITY,
Biologische Anstalt Helgoland, (West Germany).
O. Kinne.
Netherlands Journal of Sea Research, Vol 3, No 2, p 222-224, August 1966. 9 fig, 2 tab, 88 ref.

Descriptors: *Estuaries, *Salinity, Aquatic plants, Aquatic animals, *Physiological ecology, *Ecology, *Estuarine environment, Stress.

Ecologically, most estuaries represent zones of reduced competition and thus may serve as refuges for organisms which have a great potential for compensating ill effects of physico-chemical properties of their environment, but at the same time have a small potential for competition. Four groups of compensatory devices available to counteract detrimental salinity effects are briefly discussed, namely, escape, reduction of contact, regulation and adaptation. These four groups may not always be distinguishable to the last detail and may occur more or less simultaneously in one and the same individual. For fast compensations the various regulatory devices are most important. They are usually well developed in estuarine animals. Permanent environmental variation is not only the most pronounced characteristic of an estuary; it also represents one of its most ancient and conservative features. By carefully analyzing the means and mechanisms whereby oceanic organisms have succeeded in mastering the estuarine environment, future studies may bring about a better understanding of the forces at work in the process of emigration from the sea. (Sinha-OEIS)
W74-03461

WATER LAW OF SOUTHEASTERN ESTUARIES,
For primary bibliographic entry see Field 06E.
W74-03463

CHEMICAL COMPOSITION OF WATER IN AGRAKHANSKIY BAY (O KHIMICHESKOM SOSTAVE VODY AGRAKHANSKOGO ZALIVA),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
For primary bibliographic entry see Field 02K.
W74-03527

POSSIBLE CHANGES IN SALINITY OF WATER IN THE DNIEPER-BUG LAGOON IN CONNECTION WITH FUTURE DIMINUTION OF STREAMFLOW (VOZMOZHNYYE IZMENENIYA SOLENOSTI VODY DNEPROVSKO-BUGSKOGO LIMANA V SVYAZI S PREDSTOYASHCHIM SOKRASHCHENIYEM RECHNOG O STOKA),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. A. Zhuravleva, A. I. Simonov, and I. P. Belyayev.
In: Metody khimicheskogo analiza i sostav prirodnykh vod: Gidrokhimicheskiye Materialy, Vol 53, p 33-38, 1972. 2 fig, 3 tab, 1 ref.

Descriptors: *Lagoons, *Salinity, *Saline water intrusion, *Saline water barriers, *Flow control, Reservoir releases, Dams, Dam construction, Hydroelectric plants, Estuaries, Water balance, Salt balance, Seasonal, Equations.
Identifiers: *USSR (Dnieper River), Bug River.

Four possible variants of change in the hydrochemical regime of the Dnieper-Bug estuarine region at different degrees of diminished streamflow and isolation of the lagoon from the sea were examined for selection of an optimal waterworks system for providing local branches of the national economy with freshwater. Regulation of flow of the Dnieper and Southern Bug will lead to salinization of the entire estuarine region of these rivers. Complete regulation of flow will result in gradual transformation of the Dnieper-Bug lagoon into a bay of the Black Sea. Absence of a dam at Ochakov to protect the lagoon from effects of the Black Sea, and regulation of releases of the Kakhovka Hydroelectric Plant at a rate of 12.6 cu km/yr will merely prolong salinization of the lagoon by 7-8 years. Construction of a dam at Ochakov without reservoir releases will not solve the problem of lagoon salinization. Salinity of water in the reservoir will rise steadily as a result of seawater intrusion, wastewater contamination, and local salinization. Construction of the Ochakov works and regulation of discharges of the Kakhovka Hydroelectric Plant at a rate of 6-8 cu km/yr will protect the region from salinization and ensure an average slainity of water in the reservoir at 1.0%-1.5%. (Josefson-USGS)
W74-03530

NITRATE AND NITRITE IN THE SURFACE WATERS OF TWO DELAWARE SALT MARSHES,
Delaware Univ., Newark. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05B.
W74-03538

DISTRIBUTION OF FORAMINIFERA NEAR POLLUTION SOURCES IN CHALEUR BAY,
Bedford Inst., Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 05B.
W74-03596

METHYLMERCURY IN ESTUARINE SEDIMENTS,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-03602

TOPOGRAPHIC CHANGES IN THE SURF ZONE PROFILE,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02J.
W74-03609

THE ROLE OF SHELL MATERIAL IN THE NATURAL SAND REPLENISHMENT CYCLE OF THE BEACH AND NEARSHORE AREA BETWEEN LAKE WORTH INLET AND THE MIAMI SHIP CHANNEL,
Miami Univ., Fla. Marine Lab.
G. A. Rusnak, K. W. Stockman, and H. A. Hofmann.
Available from NTIS as AD-715 986, for $3.00 paper copy, $1.45 microfiche. Final Report No. ML-66857 prepared for Army Coastal Engineering Research Center, October 1966. 61 p, 12 fig, 8 tab, 36 ref, 4 append. DA-49-055-CIV-ENG-63-12.

Descriptors: *Florida, Coasts, *Beach erosion, *Shallow water, *Sediment transport, Mineralogy, *Inlets (Waterways), *Tidal effects, Bays, Sounds, Weathering, Deltas.
Identifiers: *Sand replenishment, Shell, Nearshore, Beach replenishment.

Study of beach-face and foredune sand samples, collected at intervals of approximately 8 nautical miles over a total distance of 277 nautical miles of beach, was made in an effort to evaluate the sand replenishment cycle. The methods used included grain-size determinations, mineralogic examination of shells and other constituents by x-ray diffraction and optical techniques, standard paleontologic examination of shell assemblages, and assays of contained radiocarbon activity. It may be concluded that relatively little shell is being contributed to the northern beaches of Florida either by erosion of 'older' deposits or contributions from contemporaneous sources. Beaches of South Florida in the vicinity of Lake Worth to Miami receive relatively little quartz sands from northern flood plains and apparently derive equal amounts of shell from old deposits and from contemporaneous sources. Loss of sand from the beaches of South Florida near Lake Worth to Miami may be attributed in part to inlet capture of replenishment sand by tidal currents, but discounting the estimated capture by inlets still leaves substantial losses of beach sand to other processes. The evidence for loss to inlets is found in the development of tidal deltas within bays and sounds and in the silting-up of these bays. Apparently, the unaccounted for sand loss is attributable to the spilling of sand off the narrow shelf and loss to deep water. (Sinha-OEIS)
W74-03610

THE SALINITY REGIME AND EXCHANGE CHARACTERISTICS OF A SHALLOW COASTAL BAY SYSTEM,
Texas A and M Univ., College Station. Dept. of Oceanography and Meteorology.
T. Sakou.
Available from NTIS as PB-168 970, for $6.00 paper copy, $1.45 microfiche. Technical Report Reference 63-21T, August 1963. 170 p, 83 fig, 20 tab, 29 ref. 299. NSF-G19780.

Descriptors: *Texas, Coasts, *Bays, Shallow water, *Salinity, *Forecasting, *Estuaries, *Mathematical models, Gulf Coastal Plain, Mississippi.

A shallow coastal bay system, consisting of several bay units each of which is characterized by quasi-homogeneous salinity and by relatively restricted interconnecting tidal passes, has been investigated with respect to its salinity regime and exchange characteristics. Particular emphasis is on

the temporal features of the salinity and their predictability from known controlling factors. Data from prototype and hydraulic model observations for the Lake Pontchartrain-Lake Borgne system were used for the analysis. The salinity prediction model is formulated on the basis of the equations of continuity and of salt conservation. The prediction equations for the model were tested by reconstructing the salinity regime for two separate years as an initial value problem using only the inflow data and the control salinity of the outer bay as input. The stability and inherent errors of the forecasting relations is discussed. Spectral analysis applied to 12 years of prototype data (salinity and inflow) demonstrates the effectiveness of correlation functions, power spectra and cross-spectra of the variables involved in the description and interpretation of the salinity regime with respect to the frequency response characteristics of the bay system. The cross-spectra are examined in relation to the possibility of applying optimum linear prediction. It was found that better optimum prediction could be made by transforming the input and/or output variables. It is demonstrated that the prediction of the major features of the salinity regime can be made and the merits of the various approaches are discussed. (Sinha-OEIS)
W74-03611

PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL. HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 08B.
W74-03613

A MODEL STUDY OF THE ENTRANCE CHANNEL DEPOE BAY, OREGON,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 08B.
W74-03614

LONG WAVE STUDY OF MONTEREY BAY,
Naval Postgraduate School, Monterey, Calif.
T. J. Lynch.
Available from NTIS as AD-712 794, for $3.00 paper copy, $1.45 microfiche. M Sc thesis, September 1970. 89 p, 29 fig, 9 tab, 7 ref, 3 append.

Descriptors: *Bays, *Seiches, *Waves (Water), *Coasts, *California, Submarine canyons.
Identifiers: Monterey Bay (CA), Oscillations, *Long waves.

Monterey Bay, on the west coast of the United States, is unique in that it is a large, symmetric, semi-elliptical bay divided north and south by the deep Monterey Canyon. The effect of the canyon on seiching within the bay and on long wave oscillations within the bay was studied by analyzing synchronized wave records at each end of the bay. Power spectra and cross spectra calculated for five periods selected from six months continuous data indicate the Monterey Canyon has a profound effect on the bay's oscillating characteristics. The canyon appears to act as an impedence barrier dividing the bay into two independent oscillating basins each having recurring long-period waves which persist during significant long-wave activity. Extensive reference is made to the work of Wilson, Hendrickson and Kilmer (1965) in their feasibility study for a surge-action model of Monterey Harbor, California. (Sinha-OEIS)
W74-03615

SURFACE CHARACTERISTICS OF WINDROWS,
Naval Postgraduate School, Monterey, Calif.
R. W. Ortengren, Jr.
Available from NTIS as AD-683 803, for $6.00 paper copy, $1.45 microfiche. M Sc thesis, December 1968. 53 p, 16 fig, 21 ref, 2 append.

Descriptors: *California, *Winds, Surface water, *Aerial photography, Coasts, *Bays.
Identifiers: Monterey Bay (CA), *Wind slicks, *Windrows.

Aerial photographs were taken of windrow accumulations in Monterey Bay on 1, 8, 15 and 22 October 1968. A Fairchild T-11 aerial mapping camera was used, with photographs taken approximately every two minutes over 40 to 60 minute periods. Windrows were marked with accumulations of computer cards, wind speed measured by cup anemometer, and wind direction taken with the aid of a MK.6 Smoke Float. Sea surface temperature, depth of the thermocline, and surface air temperature measurements were taken concurrently. An attempt was made to correlate windrow spacing and wind speed, to find mean deflection of windrows relative to the wind, to determine any relationship between row spacing and depth of the thermocline, and to find the response time of windrow orientation to a wind shift. Windrow spacing was found to depend on other factors than wind speed. Deflection angles varied between 20 degrees left and 20 degrees right, with 0 degrees being the most common angle. No correlation was found between depth of the thermocline and row spacing. Response time fell between two and four minutes. (Sinha-OEIS)
W74-03618

ONTOGENY OF A SALT MARSH ESTUARY,
Woods Hole Oceanographic Institution, Mass.
A. C. Redfield.
Science, Vol 147, No 3653, p 50-55, January 1, 1965. 13 ref. NSF GP2042.

Descriptors: New England, *Estuaries, *Salt marshes, *Sand spits, *Sedimentation, *Coastal marshes, Tidal marshes, *Massachusetts.
Identifiers: Barnstable (MA), Tidal creeks.

The development of a typical New England salt march, and the growth of the sand spit which shelters it, during the past 4000 years has been reconstructed from soundings and borings of the peat. The results have been interpreted with the aid of observations on the structure of the marsh and estimates of the rate of its vertical accretion based on carbon-14 determinations. The reconstructions provide a picture of the ontogeny of the Barnstable marsh which is orderly and plausible. They indicate that the sand spit has grown eastward during a period of about 4000 years. The marsh, which consisted at first of isolated pockets in protected indentations of the upland, became continuous and began to spread into the enclosure from along the upland margin as sediment accumulated in its shallower parts and protection from the sea became more complete. The development of marsh along the margin of the sand spit proceeded more slowly, perhaps because the basin deepened with distance from the upland and more time was required for sedimentation ot reduce its depth. The broad sounds between the advancing tongues of marshland became the site of the future creeks, and the meandering channels in the sand which formed their bottom defined the final pattern which these creeks assumed. High marsh has now extended to the margin of these channels and at present the creeks are in quasi-equilibrium with the hydraulic forces which arise from the quantity of water which they must carry in response to the rhythm of the tide. (Sinha - OEIS)
W74-03621

HYDRAULIC MODEL TESTS OF ESTUARIAL WASTE DISPERSION,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 05B.
W74-03622

NEAR-SHORE CIRCULATION IN THE CALIFORNIA CURRENT,
Scripps Institution of Oceanography, La Jolla, Calif.
R. A. Schwartzlose, and J. L. Reid.
California Marine Research Committee, Cooperative Oceanic Fisheries Inventigation Report, Vol 16, p 57-65, 1972. 10 fig.

Descriptors: *California, *Coasts, *Circulation, Currents (Water), Seasonal, *Ocean currents, Pollution.
Identifiers: *Near-shore circulation, Geostrophic flow, Davidson Current, Surface currents.

A brief review and discussion of near-shore circulation in the California Current presents charts which show a 16-year mean chart of the surface currents (relative to geostrophic flow) along the California coast in winter (January). The normal offshore flow all during the year is towards the southeast. In the wintertime the Davidson Current nearshore moves northward opposite to the current farther offshore. This northward flow in winter is attributed to the seasonal change in the wind patterns across California, Oregon and Washington. The winter winds are primarily from the south in the coastal area northward from San Francisco. (Sinha - OEIS)
W74-03624

THE ATYPICAL PHOSPHATE CYCLE OF ESTUARIES IN RELATION TO BENTHIC METABOLISM,
Rhode Island Univ., Kingston. Narragansett Marine Lab.
For primary bibliographic entry see Field 05C.
W74-03626

SELECTED LEGAL AND INSTITUTIONAL ASPECTS OF THE TEXAS COASTAL ZONE.
Texas Law Inst. of Coastal AND Marine Resources, Houston.
For primary bibliographic entry see Field 06E.
W74-03630

PROCEEDINGS OF TENTH CONFERENCE ON COASTAL ENGINEERING, TOKYO, JAPAN, SEPTEMBER, 1966, VOLUME I.
For primary bibliographic entry see Field 08B.
W74-03674

OBSERVATIONS OF THE TRANSFORMATION OF OCEAN WAVE CHARACTERISTICS NEAR COASTS BY USE OF ANCHORED BUOYS,
Kyoto Univ. (Japan). Disasters Prevention Research Inst.
For primary bibliographic entry see Field 08B.
W74-03676

RESPONSE CHARACTERISTICS OF UNDERWATER WAVE GUIDE,
Tokyo Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-03677

A POSSIBILITY OF GENERATION OF SURF BEATS,
Tokai Univ., Tokyo (Japan). Coll. of Marine Science and Technology.
For primary bibliographic entry see Field 08B.
W74-03681

A STUDY ON WAVE TRANSFORMATION INSIDE SURF ZONE,
Tokyo Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-03682

ON A COEXISTENCE SYSTEM OF FLOW AND WAVES,
Kobe Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-03688

SEDIMENT TRANSPORT AND ACCRETION AROUND THE COASTLINES OF JAPAN,
Western Australia Univ., Nedlands. Dept. of Civil Engineering.
R. Silvester.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 29, p 469-488, 1967. 3 fig, 12 ref.

Descriptors: *Sediment transport, *Coasts, *Waves (Water), Shoals, *Littoral drift, Storms, Profiles, *Erosion, *Sedimentation.
Identifiers: *Japan (Inland Sea), Wave climate, Swell.

The transport of material by waves is an important aspect of the overall movement to a destination of either coastal plain or offshore shoal. The persistent occurrence and direction of ocean swell make this wave domain the most important in this process. In enclosed seas littoral drift is effected by storm type waves, per medium of a different beach profile from that on oceanic margins. Accepting that the wave climate has not changed significantly over geologic time, it is possible to picture the geomorphology of river and coastal plains to the present continental outline. The coastlines of Japan are examined with such an emphasis. Lowland so formed is of extreme economic importance. In order to promote accretion of further areas on a large scale, the character of the sediment and of the natural forces available at any location must be considered. Suitable structures and their siting within natural shoreline features are discussed. (See also W74-03674) (Sinha-OEIS)
W74-03690

MODEL STUDY ON THE FILLING-UP OF A FISHERY HARBOR BY DRIFTING SAND,
Kyoto Univ. (Japan). Disasters Prevention Research Inst.
H. Noda.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 34, p 564-594, 1967. 19 fig, 1 tab, 8 ref, 1 plate.

Descriptors: *Harbors, *Estuaries, Sedimentation, *Sediment transport, *Currents (Water), *Waves (Water), Suspended load, *Coasts, Model studies.
Identifiers: Wave height, Oscillations, Japan.

Field investigations and model experiments are described whose purpose was both to discover the mechanism of the movement of coastal material and its deposition in harbor basins and to consider some protective measures which might be taken against the filling-up of basins by drifting sand. From the viewpoint of similarity for the falling velocity of bottom materials, vinyl pellets were used as the model sediment. In experiments the height of the deposition of sediment was measured, together with the direction and velocity of currents, while in various cases the wave height inside and outside the harbor was measured as a means of elucidating the behavior of drifting sand as it fills up a harbor basin. It is concluded from these experiments that the filling-up of a harbor basin can be reproduced quantitatively in a model and that currents induced in basins by waves and harbor oscillations may have an important bearing on the problem of filling-up. (See also W74-03674) (Sinha-OEIS)
W74-03691

A PETROGRAPHIC STUDY ON LITTORAL DRIFT ALONG THE ISHIKAWA COAST, JAPAN,
Senshu Univ., Tokyo (Japan).
M. Aramaki, and S. Takayama.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 36, p 615-631, 1967. 11 fig, 1 tab, 4 ref.

Descriptors: *Littoral drift, *Sediment transport, *Beaches, Profiles, Storms, *Sedimentation, *Waves (Water), Slopes.
Identifiers: *Japan (Ishikawa Coast), Wave steepness.

Based on the longitudinal variation series in various properties of beach sediments and topographic profiles along the southern coast of Ishikawa Prefecture, Japan, the prevailing direction and mechanism of littoral drift are discussed. The principal source of the beach material along the southern Ishikawa coast is the river Tedori. The beach material moves predominantly towards the southwest. The results of the survey of beach profiles at three hour intervals revealed the pronounced erosion of beach, i.e. waves cut away a vertical thickness of 1.5 meters of the beach material and overall landward retreat of waterline amounted to 16 meters during the passage of a depression. The beach changes associated with the passage of periodic local storms cause a drastic cut and fill of the beach in a short period of time. The largest wave was some 2 meters in wave height and 8.5 seconds in wave period. Also, the erosion and deposition on the beach might be decided by the scale of wave, e.g. the wave steepness. (See also W74-03674) (Sinha-OEIS)
W74-03692

TRANSPORT PATTERNS IN THE CHAO PHYA ESTUARY,
Waterloopkundig Laboratorium, Delft (Netherlands).
E. Allersma, A. J. Hoekstra, and E. W. Bijker.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 37, p 632-650, 1967. 9 fig.

Descriptors: *Estuaries, *Sediment transport, *Harbors, River flow, Sand bars, Hydrography, Flocculation, *Sedimentation, Tidal effects, Model studies.
Identifiers: Sea state, *Thailand (Chao Phya Estuary).

The port of Bangkok, the main gateway for traffic into Thailand, is situated in the estuary of the Chao Phya River. Increasing navigation demands improvement of the harbor and its 55 km long approach channel but the interests of agriculture and municipal water supply must also be taken into account. The Netherlands Engineering Consultants (NEDECO) in combination with the Delft Hydraulics Laboratory have made a four-year study of the estuary covering a field survey and a hydraulic model test. The observations in nature served to obtain insight into the estuarine transport pattern in relation with the boundary conditions given by the regimen of the river and the state of the sea. The small scale tests gave indications of the changes in these phenomena to be expected from alterations of the situation in the estuary and of the discharge characteristics of the river. (See also W74-03674) (Sinha-OEIS)
W74-03693

LITTORAL BYPASSING AND BEACH RESTORATION IN THE VICINITY OF PORT HUENEME CALIFORNIA,
Army Engineer District, Los Angeles, Calif. Coastal Engineering Branch.
For primary bibliographic entry see Field 08B.
W74-03694

EQUILIBRIUM FLOW AREAS OF TIDAL INLETS ON SANDY COASTS,
California Univ., Berkeley. Coll. of Engineering.
For primary bibliographic entry see Field 08B.
W74-03695

SUSPENDED SEDIMENT IN A TIDAL ESTUARY,
Liverpool Univ. (England). Dept. of Civil Engineering.
A. R. Halliwell, and B. A. O'Connor.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 40, p 687-706, 1967. 9 fig, 1 tab, 16 ref.

Descriptors: *Estuaries, *Tides, *Sediment transport, *Suspended solids, Salinity, Temperature, Hydraulics, Density, Mixing, Seasonal, *Littoral drift, *Waves (Water).
Identifiers: *Mersey Estuary (England), Tidal range, Wave action.

A brief description is given of work being carried out in the Mersey Estuary, England. Attention is drawn to the factors influencing the sediment movement and the variables, such as velocity, suspended solids, salinity and temperature that must be measured in order to define the sedimentation complex adequately. A study is made of the effect of variations in temperature and tidal range upon the mean concentration of suspended solids observed at stations in the Estuary; the relationship proposed is of the form $C = A + (B+CT)R + DT$, where A, B, C and D are constants, R is the tidal range and T is the water temperature. The vertical distribution of suspended sediment is discussed and examples given which do not conform to existing theory. Variations in the vertical distributions of sediment along the Estuary are examined and explained theoretically by reference to the existing bed conditions and hydraulic characteristics of the Estuary. See also W74-03674) (Sinha-OEIS)
W74-03696

PROCEEDINGS OF TENTH CONFERENCE ON COASTAL ENGINEERING, TOKYO, JAPAN, SEPTEMBER, 1966. VOLUME II.
For primary bibliographic entry see Field 08B.
W74-03699

HYDRAULIC SURVEY AND MODEL INVESTIGATION OF THE INNER RANA FJORD,
Norges Tekniske Hoegskole, Trondheim. River and Harbor Lab.
T. Carstens, and A. Traetteberg.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 2, Part 4, Chap 74, p 1313-1330, 1967. 10 fig, 5 ref.

Descriptors: *Fjords, *Stratification, Physiography, *Sediment transport, *Tidal effects, River flow, Density stratification, Salinity, Estuaries.
Identifiers: *Norway (Rana River).

The characteristic feature of the water masses in a fjord is their stratification. This stratification and its annual cycle are explained in terms of the physiography of the fjord regions. The glacial origin of these regions is outlined in order to study the sediment sources and the present sediment regime. A case study of a fjord in Northern Norway is reported. The results of a field survey comprising measurements of tidal and river flows are given. The measurements revealed that the tidal flow had a steady component giving a horizontal circulation in the fjord, in addition to the vertical circulation associated with the diffusion of salt water upwards into the surface layer. A reduced scale model of the lower river and the Inner Fjord was built to avoid adverse affects of a constriction

of the river mouth. The model also showed that a small jetty would turn the turbid surface jet away from the incoming tidal current towards the outbound current caused by the horizontal circulation, thereby relieving the harbor area of some of its present sediment supply. (See also W74-03699) (Sinha-OEIS)
W74-03701

SALINITY DISTRIBUTION AND EFFECT OF FRESH WATER FLOWS IN THE HOOGHLY RIVER,
Central Water and Power Research Station, Poona (India).
C. V. Gole, and P. P. Vaidyaraman.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 2, Part 4, Chap 79, p 1412-1434, 1967. 12 fig, 2 tab, 4 ref.

Descriptors: *Estuaries, *Saline water intrusion, Sedimentation, Water supply, Potable water, *Saline water - freshwater interfaces, Freshwater, River flow, Circulation, Bores, Sea water, Salinity.
Identifiers: *India (Hooghly River), India, Freshwater flows, Shoaling, Freshets.

An examination of the hydraulic characteristics of the Hooghly River with particular reference to the pattern of salinity intrusion and the effects of fresh water flows has been made. The conditions prevailing are such that during the brief period of fresh water flows the problem of salinity intrusion is absent. The beneficial effect of fresh water flows in improving the navigable depths along the river is also shown. The cessation of fresh water flows causes the deterioration of navigable depths due to the landward movement of sediment; it also results in the upstream encroachment of salinity affecting the supply of drinking water to the City of Calcutta. Even during the period in the freshet when the salinity profiles exist the estuary remains well-mixed. The need for augmentation of fresh water flows for improving the conditions has also been brought out. (See also W74-03699) (Sinha-OEIS)
W74-03702

STUDIES ON SALT WEDGE BY ULTRASONIC METHOD,
Hokkaido Univ., Sapporo (Japan). Dept. of Engineering Science.
H. Fukushima, M. Kashiwamura, and I. Yakuwa.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 2, Part 4, Chap 80, p 1435-1447, 1967. 15 fig, 11 ref.

Descriptors: *Estuaries, *Saline water intrusion, Saline water - freshwater interface, *Ultrasonics, Mixing, Internal waves, *Stratified flow.
Identifiers: *Japan (Ishikari River), *Salt wedge.

A series of observations and studies have been made on the salt wedge at the Ishikari River. As a new technique of detecting a salt wedge, the ultrasonic method was used, which is the same with an echo-sounder in principle but of particularly high sensitivity. The record presents a detailed profile of a salt wedge as well as some dynamical behaviors, namely, a stability or a mixing process of a longitudinal change of a thickness of the fresh water, an internal jump or an internal wave, etc. The ultrasonic method is very useful for a study of the salt wedge and even a common stratified flow. (See also W74-03699) (Sinha-OEIS)
W74-03703

PREDICTED FLUSHING TIMES AND POLLUTION DISTRIBUTION IN THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-03704

PRELIMINARY RESULTS AND COMPARISON OF DYE TRACER STUDIES CONDUCTED IN HARBORS, ESTUARIES, AND COASTAL WATERS,
Naval Oceanographic Office, Washington, D.C.
For primary bibliographic entry see Field 05B.
W74-03705

RESPONSE CHARACTERISTICS OF TOKYO BAY TO INCIDENT LONG WAVES,
Central Research Inst. of Electric Power Industry, Tokyo (Japan).
M. Hino, and K. Hino.
Coastal Engineering in Japan, Vol 8, p 57-69, December 1965. 18 fig, 8 ref.

Descriptors: *Waves (Water), Statistical methods, *Harbors, Numerical analysis, Equations, Coastal structures, Resonance, Energy, Estuaries, *Seiches, *Storm surges, *Shore protection.
Identifiers: *Japan (Tokyo Bay), Harbor paradox, Boundary conditions, Incident waves, *Long waves, Periodicity, Inertial terms, Nonlinear terms.

Response characteristics of Tokyo Bay to long waves are investigated by a numerical experiment. The experiment was completed by only one run with use of the statistical concepts, instead of repeating, as usual in laboratory experiments, the same kind of response calculations to sinusoidal waves with differing wave length. Results and conclusions are: Although the incident waves seem to propagate towards the innermost coast as if there were no boundaries, the correlation functions show that waves with long period are almost completely reflected at the innermost coast of the bay. The dike which is planned at the central portion for storm surge protection reduces greatly the arrival of the wave front. The predominant resonant periodicity is about 60 min to 90 min and its harmonics. The periodicity coincides with the field observation. Consequently, it is anticipated and, in fact, sometimes experienced that extraneous high water levels occur, especially, superposed on storm surges, by resonant action with winds or presure fluctuations and incident waves such as 'Tsunami'. The construction of the dike will not change considerably the response characteristics. That is, the 'harbor paradox' is scarcely expected. Waves with longer periodicities transport the energy from the entrance inwards, while waves with shorter periodicities play a role to dissipate the energy by the frictional force. The nonlinear terms (inertial and non-linear friction term) act to transport the energy of the waves with lower frequency to waves with high frequency. The process is the same as the mechanism of turbulent shear flow field. Further calculations are needed by inserting a 'mathematical wave filter' at the entrance of the bay to exclude the effect of re-reflection of waves. (Sinha-OEIS)
W74-03706

CHARACTERISTICS OF SEDIMENTARY ENVIRONMENTS IN MORICHES BAY,
California Univ., Los Angeles.
M. M. Nichols.
In: Paper in Marine Geology Shepard Commemorative Volume, 1964. (R. L. Miller, ed.) Chapter 16, p 363-383, 11 fig, 1 tab, 13 ref.

Descriptors: *Estuaries, Hurricanes, Tidal effects, Floods, *Barrier islands, *Sedimentation, *Bays, Texas, *New York, Environments.
Identifiers: Moriches Bay (NY).

The intent is to describe the environments of deposition in Moriches Bay and to relate the distribution pattern of recent sediments to their general conditions of formation. The results provide an interesting comparison with the bays in Texas, and should aid in a broader understanding of ancient lagoon environments. In its general setting on a coastal plain, Moriches Bay has much in common with bays along the central Texas coast near Rockport. It lies behind a barrier island parallel to the coast and has a small tidal range. Like the Texas area, Moriches Bay is subject to short-term fluctuations in the environment. Storm tides, hurricanes, and floods from the land occur at times in both; whereas the Texas region has excessive droughts, Moriches is susceptible to frequent winter freezes. Gross features of the sediments at Moriches are comparable to those in the Texas bays. Contrasts become apparent when sediment characteristics are examined in detail and when sediment sources are considered. (Sinha-OEIS)
W74-03707

MODELS PREDICT ENVIRONMENT.

Sea Frontiers, Vol 16, No 6, p 352-356, November-December 1970. 4 photo.

Descriptors: *Water control, *Water management (Applied), *Estuaries, *Model studies, *Hydraulic models, Water, Water conservation, Water distribution, Flood control, Water levels, Water level fluctuation, Research facilities, Dredging, Dikes, Thermal pollution, Flow.

The Army Corps of Engineers' manipulation of the coastal environment has been tested, in miniature, for two decades at the Waterways Experiment Station in Vicksburg, Mississippi. Physical changes in estuaries caused by such things as channel dredging, construction of dikes and causeways, and closure of secondary channels, have had major effects on hydraulic, salinity, and flushing characteristics of the estuaries involved, and those effects can be studied in the models. Tests in models can help locate the best sites for open water spoil disposal to prevent deposition of the spoil on sensitive zones of the estuary. Long-range schemes are under consideration for redistribution of flow among river basins to increase water supplies to dry areas. Models are also used to study thermal waste diffusion and recirculation of heated waste as larger electrical power plants are constructed. While land reclamation in estuaries has been heavily criticized, hydraulic models can be used for quantitative determination of the effects of such projects on tidal and salinity conditions in the estuaries involved. (Ritchie-Florida)
W74-03713

STUDY OF A POLLUTED ENVIRONMENT (THE OLD PORT AREA OF MARSEILLES): THE INFLUENCE OF PHYSICAL AND CHEMICAL CONDITIONS ON THE CHARACTERISTICS OF THE POPULATION OF THE QUAY, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 05C.
W74-03719

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

DEEP-WELL INJECTION OF DESALTING--PLANT WASTE BRINE,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 05E.
W74-03250

METHOD AND APPARATUS FOR PURIFYING SEA WATER,
Max-Planck-Gesellschaft zur Forderung der Wissenchaften e.v., Goettingen (West Germany). (Assignee).
G. Huckstedt, and H. Jakobs.
U.S. Patent No. 3,772,192, 4 p, 2 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 916, No 2, p 663, November 13, 1973.

Descriptors: *Patents, Copper, Sea water, *Desalination, Foam separation, Pollution abatement, Separation techniques, Equipment, *Water purification, *Suspended solids, *Organic matter, Heavy metals, *Ions.
Identifiers: *Sea water purification, Suspended organic matter, Froth separation.

A method and apparatus for purification sea water contaminated with ions of a heavy metal and/or suspended organic matter is described. Because of its salt content, sea water tends to froth or foam under the action of air even in the absence of surface active agents. When trace amounts of suspended organic matter of relatively high molecular weight or minute amounts of heavy metal ions such as copper are present in the raw water, the froth accumulates the contaminants at the liquid-gas interface of the bubbles in the froth. Apparatus includes an expansion vessel, a mixing device for intimately mixing the water to be purified with air, a feeding device for feeding the resulting mixture of water and air to the expansion vessel under a pressure higher than the pressure in the vessel, and an outlet on the bottom portion of the vessel for withdrawing purified water. A tubular riser extends upward from the vessel for receiving the froth which is generated by expansion of the water/air mixture in the vessel. The froth is released from a portion of the riser space remote from the expansion vessel in an upward direction. A rinsing device is provided for applying a film of liquid to an inner face of the riser while keeping the remainder of the space in the riser substantially free from the liquid. (Sinha-OEIS)
W74-03654

CONTAINING AND REMOVING OIL SPILLS ON WATER,
Phillips Petroleum Co., Bartlesville, Okla. (assignee).
H. E. Alquist, and R. T. Werkman.
U.S. Patent No 3,770,627, 2 p, 1 tab, 3 ref; Official Gazette of the United States Patent Office, Vol 916, No 1, p 251, November 6, 1973.

Descriptors: *Patents, Oil pollution, *Oil spills, *Crude oils, *Pollution abatement, Water pollution control, Water quality control, Water treatment, Separation techniques.

A method is provided to produce a coherent mass containing oil in such a form that it can be removed from a water surface. It consists of applying to the surface of the oil (1) a particulate thermoplastic, organic polymer of particle size less than 10 mesh and of sufficient density to float on the oil and (2) an inflammable substance, igniting the inflammable substance to fuse the polymer, thereby forming a coherent mass of fused polymer containing the oil. The fused mass can be easily skimmed from the water surface. Suitable flammable materials which can be used are identified as hydrocarbons in the kerosene boiling range (250 to 500 deg F). (Sinha - OEIS)
W74-03670

THE OPTIMAL TIME TO START THE OPERATION OF A DESALTING PLANT IN ISRAEL,
Tel-Aviv Univ. (Israel). Dept. of Economics.
G. Fishelson.
Water Resources Bulletin, Vol 9, No 4, p 801-815, 1973. 3 fig, 2 tab, 14 ref.

Descriptors: Water supply, *Water demand, Dynamic programming, *Optimization, *Desalination plants, Agriculture.
Identifiers: *Israel.

The recognition of water as the limiting resource in Israel's agricultural development has led to the use of many water-saving techniques and the exploration of nonconventional sources of water, such as desalting. This study attempts to determine the optimal time to start a desalting operation. A supply function for aggregate agricultural production is derived from a constant elasticity of substitution (CES) function using water and a composite good as inputs. The intersection of demand and supply yields a sequence of equilibrium prices, quantities, and marginal value products for water (MVP) from which the optimal time can be determined. A modified form of MacAvoy and Peterson's cost estimates is used. The assumption of a single technically available plant size introduces the problem of indivisibility, modifying the optimality rule by the equating of per unit costs of production to average MVP of the additional water at year t. Following this approach, the optimal time occurs in 46-47 years. New plants become optimal every two-three years. Within 20 years the amount of water used in agricultural production would be equal from conventional and nonconventional sources. Technical innovation would lower cost of desalting, allowing construction within a 30 year period but increasing the time interval between additional plants. (Schroeder-Wisconsin)
W74-03750

3B. Water Yield Improvement

THE EFFECTS OF WATER CONSERVATION WORKS ON THE REGIME OF MORECAMBE BAY,
Hydraulics Research Station, Wallingford, (England).
For primary bibliographic entry see Field 04A.
W74-03483

THE CALIFORNIA STATE WATER PROJECT IN 1968,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 06B.
W74-03502

3C. Use of Water of Impaired Quality

THE EFFECTS OF SURFACE IRRIGATION WITH DAIRY MANURE SLURRIES ON THE QUALITY OF GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05B.
W74-03339

PROPOSED MUNICIPAL WASTE WATER--GROUNDWATER EXCHANGE, CITY OF TUCSON: AVRA-MARANA VALLEY.
Arizona Water Resources Research Center, Tucson; and Arizona Agricultural Experiment Station, Tucson.
For primary bibliographic entry see Field 05G.
W74-03340

OPTIMIZING WATER USE: THE RETURN FLOW ISSUE,
Colorado Univ., Boulder. School of Law.
For primary bibliographic entry see Field 06E.
W74-03385

RECYCLING ON THE LAND: AN ALTERNATIVE FOR WATER POLLUTION CONTROL,
Natural Resources Defense Council, Washington, D.C. Project on Clean Water.
For primary bibliographic entry see Field 05D.
W74-03387

SUITABILITY OF FOOD PROCESSING WASTE WATER FOR IRRIGATION,
Agricultural Research Service, Norfolk, Va.
For primary bibliographic entry see Field 05D.
W74-03482

CONVENTIONAL TREATMENT METHODS FOR PULP AND PAPER MILL WASTES AND DISPOSAL ON LAND FOR IRRIGATION,
Central Public Health Engineering Research Inst., Nagpur (India).
For primary bibliographic entry see Field 05D.
W74-03547

3D. Conservation in Domestic and Municipal Use

COMPARATIVE ANALYSIS OF RESIDENTIAL WATER USE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
For primary bibliographic entry see Field 06D.
W74-03324

HUMAN FACTORS INVOLVED IN THE DEVELOPMENT OF A WATERSHED IN YABUCOA,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W74-03325

THE IMPACT OF POLICY VARIABLES ON RESIDENTIAL WATER DEMAND AND RELATED INVESTMENT REQUIREMENTS,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 06D.
W74-03477

A GUIDE TO DECISION MAKING FOR WATER RESOURCES MANAGEMENT IN THE SAN ANTONIO REGION.
San Antonio River Authority, Tex.
For primary bibliographic entry see Field 06B.
W74-03484

MASTER PLAN FOR WATER SUPPLY, BUCKS COUNTY, PENNSYLVANIA, 1970.
Justin and Courtney, Philadelphia, Pa.

Prepared for the Bucks County Planning Commission, Doylestown, Pa. May 1, 1972. 33 p, 24 fig, 8 tab, 136 ref, 7 append.

Descriptors: *Planning, *Water supply, Groundwater, *Delaware River, *Pennsylvania, Costs, Water pollution, Carbonates, Low-flow augmentation, *Water pollution control.
Identifiers: Utility extension, Bucks County (Penn.), Neshaminy Creek (Pa).

Optimal water supply facilities, assuming a policy of enhancing economic growth, are projected for suburban-rural Bucks County. Criteria for projection of facilities were based on population projection, analysis of existing water supply requirements, availability of water as indicated from this and previous studies, and project design criteria from this and previous studies. Development intervals are 1975, 1990, and 2010. Groundwater, estimates as providing 50% of Bucks County's water is the least expensive supply of drinking water, and will be used whenever yield and quality are satisfactory. Availability is uncertain, future wells are called for, but available groundwater supply is shown as constant at present levels in a pictogram. Contamination by coliform organisms apparently

caused by housing and industrial development is evident at various locations in the Carbonate formations. Surface water sources will be the Delaware River and two multi-purpose reservoirs on tributaries of Neshaminy Creek. To augment the reservoirs at low-flow periods, water will be pumped from the Delaware. Water supply treatment facilities will be located below the reservoirs near Langhorne and New Britain. The county is divided into 29 water supply sub-regions based on existing water systems or watersheds. Existing and projected water supply for each sub-region is analyzed until 2010. Costs of water supply are estimated for horizon years by sub-regions and by project. Water imports and exports receive consideration. Several maps illustrate locations of projects. (Stein - North Carolina)
W74-03629

THE GREAT MIAMI RIVER CORRIDOR STUDY: A CONCEPT PLAN.
Kiley (Dan) and Partners, Charlotte, Vt.
For primary bibliographic entry see Field 06F.
W74-03631

NATURAL FEATURES ELEMENT OF THE COMPREHENSIVE PLAN: A PLAN FOR ACTION.
DeKalb County Planning Dept., Decatur, Ga.
For primary bibliographic entry see Field 04C.
W74-03633

CONSERVATION-OPEN SPACE PLAN; AMENDMENTS TO THE SPRINGFIELD COMPREHENSIVE PLAN.
Springfield Planning Dept., Mass.

May, 1972. 23 p, 1 append.

Descriptors: *Conservation, *Wetlands, Planning, Recreation, Parks, *Land use, Marshes, Environmental effects, Soils, Natural resources, Water resources, Wildlife, *Massachusetts, Ponds, Rivers, Lakes, Streams, *Comprehensive planning.
Identifiers: *Open space, Soil Conservation Service, Springfield (Mass.), Water-oriented recreation, Streambelt network.

A Conservation Commission was established in Springfield in 1960 to protect and develop the natural resources of the city. Since then the Commission has acquired about 200 acres of natural land and kept it essentially open. The acquisitions were largely based on the City's comprehensive plan. The goals, data, and criteria being used by the Commission to select new sites for acquisition are discussed. Goals include the preservation of land for public access to lakes and streams, preservation of wetlands to control runoff and prevent flooding, preservation of land for recreation and natural beauty, and preservation of land for wildlife habitats. Data for the analysis of possible sites come largely from two Soil Conservation Service studies: a detailed soil survey covering soil types, slopes, and water table levels; and a natural resources inventory identifying all remaining natural areas in the city. Twenty-one specific sites are recommended to be acquired: eight are marshes, swamps, and bogs; six are located along streams; and seven are to be used for access to recreational lakes and rivers. Additional areas to be included in the open space-recreation category pending further investigation or changing conditions are identified. Implementation of acquisition phase will be a development phase including preparation of use plans for each site and a maintenance phase with provisions for periodic maintenance. Financial considerations encompass a fair market value for the land and federal and state cost sharing programs. (Elfers - North Carolina)
W74-03634

WATER STUDY, SANTA FE PLANNING AREA.
Santa Fe City Planning Dept., N. Mex.
For primary bibliographic entry see Field 04B.
W74-03641

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME I: METHODOLOGY ANALYSIS OF WATER RESOURCE AREAS.
Alamo Area Council of Governments, San Antonia, Tex.
For primary bibliographic entry see Field 06B.
W74-03642

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME II: URBAN WATER-RELATED SERVICES.
Alamo Area Council of Governments, San Antonio, Tex.
For primary bibliographic entry see Field 06B.
W74-03643

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME III: SHORT RANGE PROGRAM 1970--1975.
Alamo Area Council of Governments, San Antonio, Tex.
For primary bibliographic entry see Field 06B.
W74-03644

WATER FACILITIES FOR EAST ORANGE AREA FOR CITY OF ORANGE AND EAST ORANGE COUNTY WATER DISTRICT.
Boyle Engineering, Santa Ana, Calif.

Engineering Report. February, 1973. 93 p, 16 fig, 46 tab, 2 append.

Descriptors: *Water supply, *Water sources, *Coordination, *Water quality control, Water storage, Water transfer, Water demand, Cost analysis, Environmental effects, Administration, Joint costs, *California.
Identifiers: Orange County (Calif.), Joint facilities, California water project.

Availability of water from the Metropolitan Water District of Southern California via the Santiago Lateral, the new possibilities of coordinating the construction and use of water supply facilities with other local water supply agencies, and the increased concern for an evaluation of environmental impacts of the proposed plans made it necessary to re-evaluate alternatives presented in an earlier document. New alternatives are summarized and a new program for orderly development of water facilities is presented. It includes sections on existing facilities, future growth and water demand, available water supply sources and their quality, and proposed water supply facilities and estimated costs. New recommendations and alternative plans are largely based on anticipated coordination between the city or Orange and the East Orange County Water District, the city of Anaheim, the Irvine Ranch Water District, and the Municipal Water District of Orange County. Some of the possible plan elements are the utilization of East Orange County Feeder No. 2, the construction of new wells, the joint construction, with two other agencies, of a new water treatment plant, and the purchase of storage capacity in the Santiago Reservoir. Advantages and disadvantages of these actions are outlined. Extensive tables and figures supplement the report. Discussion of environmental impact appears in Appendix B. (Elfers-North Carolina)
W74-03648

2020 PLAN, BOARD OF WATER SUPPLY/CITY AND COUNTY OF HONOLULU.
Honolulu City and County Board of Water Supply, Hawaii.
For primary bibliographic entry see Field 04B.
W74-03649

COMPREHENSIVE WATER SYSTEMS NEEDS PLAN, 1970-2000, ALLEGHENY COUNTY, PENNSYLVANIA.
Green Engineering Co., Sewickley, Pa.

Prepared for Allegheny County Board of Commissioners. April, 1972. Vol. I, 114 p, 58 fig, 1 append Vol II-35 plates.

Descriptors: Planning, *Water supply, Administration, *Comprehensive planning, *Water demand, Water quality control, *Projections, Urbanization, Geology, Coordination, *Water demand, Financing, *Pennsylvania, Cost analysis.
Identifiers: Allegheny County (Pa.), Water system expansion, Pittsburgh (Pa.).

As one integral element in the comprehensive planning program of the Allegheny County Planning Department, the purpose of this report is to assist the County commissioners in determining financing commitments for the expansion of the county's water supply systems. The report consists of three basic parts: (1) an inventory of existing water supply treatment, storage, and distribution facilities, with characteristics of individual systems detailed; (2) an appraisal of the raw water resources including sections on geology and water quantity and quality; and (3) an identification of future water supply needs and plans based on various considerations such as projected population trends for each service area using a computer model to determine realistic projections plus economic growth trends. Some basic conclusions and recommendations include: (1) the county has ample sources of raw water (e.g. the Allegheny, Monongahela, and Ohio Rivers) but water quality is very important. Recommended: Pollution abatement should be accelerated through increased assistance from municipal, county, state and federal governments; (2) the northern part of the county will require a major new water intake from the Allegheny River. Recommended: Investigate development of new system to serve this area; (3) the county should take the lead in developing a county-wide approach to the planning and administration of all water supply systems. Based on present day construction costs it is estimated that a total of $150 million will be required by the year 2000 for the recommended facilities. (Elfers-North Carolina)
W74-03650

WATER CONTROL APPARATUS RESPONSIVE TO LEAKAGE OR OVERFLOW CONDITIONS,
For primary bibliographic entry see Field 04A.
W74-03663

3E. Conservation in Industry

THE ECONOMIC IMPACT OF A DEEPWATER TERMINAL IN TEXAS,
Texas A and M Univ., College Station. Industrial Economics Research Div.
For primary bibliographic entry see Field 06B.
W74-03489

CLOSED WATER CIRCUITS IN A PAPER MILL PROCESSING WASTE PAPER,
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
For primary bibliographic entry see Field 05D.
W74-03540

3F. Conservation in Agriculture

DESIGN AND OPERATION OF LAND TREATMENT SYSTEMS FOR MINIMUM CONTAMINATION OF GROUNDWATER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 05D.
W74-03223

SATURATED WATER FLOW THROUGH CLAY POTS,
Illinois Univ., Urbana. Dept. of Plant Physiology and Horticulture.
L. A. Spomer.
Soil Sci Soc Am Proc. Vol 36, No 6, p 976-978. 1972. Illus.
Identifiers: *Clay pots, Drip irrigation, Electrolytic tanks, Flood irrigation, *Irrigation, *Water flow.

An electrolytic tank electric analog was used to simulate saturated water flow through standard clay pots during both flood and drip irrigation. Simulated flow patterns indicated significant zones of low flow rates, particularly during drip irrigation.--Copyright 1973, Biological Abstracts, Inc.
W74-03306

MANAGEMENT SCIENCE IN THE DEVELOPING COUNTRIES: A COMPARATIVE APPROACH TO IRRIGATION FEASIBILITY,
Italconsult, Rome (Italy).
C. J. Rose.
Management Science, Vol 20, No 4, p 423-438, December, Part I, 1973. 7 fig, 5 ref.

Descriptors: *Irrigation, *Feasibility studies, *Operations research, *Management, Agriculture, Economics, Rivers, Decision making, Constraints, Methodology, Crops, Natural resources, Mathematical models.
Identifiers: *Developing countries, *Burma, Mixed integer programming, Water availability, Mu River (Burma).

An irrigation feasibility study is described in which systems analysis methods were used to select for a well-defined geographical area an irrigation system best suited to both local and national needs. The problem was to decide what major works to build and crops to grow to make optimal use of the available natural and human resources, the availability of water being a prime consideration. The area examined comprises some one million acres of land in Burma, and the study was undertaken for the Burmese Government under the auspices of the United Nations. The solution technique used was mixed integer programming in order to be able to handle some 750 continuous variables, 50 integer variables, and 250 constraints. This paper reports on a specific project, the Mu River Valley Multipurpose Scheme, and is divided into three sections: the real problem description, adoption of solution approach, and study results. The problem was solved using both conventional and operations research methods independently; a complete comparison of the relative merits of both approaches is considered in detail. The advantages arising from the use of a mathematical model are considerable. (Bell-Cornell)
W74-03471

PHYSIOLOGY OF DROUGHT RESISTANCE IN THE SOYBEAN PLANT (GLYCINE MAX): I. THE RELATIONSHIP BETWEEN DROUGHT RESISTANCE AND GROWTH,
Sheffield Univ. (England). Dept. of Botany.
D. J. Read, and E. M. Bartlett.
J Appl Ecol. Vol 9, No 2, p 487-499. 1972, Illus.
Identifiers: *Drought resistance (Plants), Glycine-Max, Growth rates, Plant physiology, *Soybean growth, *Soil water, Root systems, Cytokinins.

Root and shoot growth of the soybean was compared over a range of soil water potentials. Small decreases in soil water potential induced large increases in root:shoot ratio. This increase was not, however, accompanied by a large reduction of total yield. With an increase of soil moisture stress the unit leaf rate increased and the leaf area ratio decreased. The reduced soil moisture potential stimulated leaf water deficits in the early stages of treatment and these deficits appeared to initiate the modification of root:shoot balance. The increase of water uptake by the larger root system and the reduction of loss from the smaller shoots enabled a balance to be achieved between uptake and loss at any given soil moisture potential so that water deficits were eliminated. The increase in unit leaf rate may be stimulated by an increase in the effective concentration of root-synthesized cytokinins reaching the shoot. Drought resistance in the soybean is based upon avoidance, but a larger variety of avoidance mechanisms are involved than has been previously postulated.--Copyright 1973, Biological Abstracts, Inc.
W74-03475

ECONOMIC BENEFITS FROM IRRIGATION,
Texas Tech Univ., Lubbock. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06C.
W74-03487

SOIL SURFACE ROUGHNESS AND STRAW MULCH FOR MAXIMUM BENEFICIAL USE OF RAINFALL BY CORN ON A BLACKLAND SOIL,
Agricultural Research Service, State College, Miss.
D. L. Myhre, and J. O. Sanford.
Soil Sce Vol 114, No 5, p 373-379. 1972. Illus.
Identifiers: Beneficial use, Capacity, *Corn, Rainfall, *Soil (Blackland), *Straw mulch treatment, Water transfer, Zea-Mays, Soil surface roughness.

Two straw mulch treatments (0 and 4484 kg/ha) and 3 soil surface conditions in the interrow (smooth, rough at emergence, and rough at 50 cm plant height) were evaluated in factorial combination over a 3 yr period using 2 cultivars of Zea mays in a 6 x 6 latin suqare. The experiment was located on a Blackland soil, Catalpa clay loam, which had an available water-holding capacity of 17 cm in the top 150 cm. Straw mulch and early soil surface roughness increased water content in the soil profile, but the mulch was more effective in increasing grain production. Mulching the soil surface increased water transfer rate during both depletion and secretion. The Mp305 X Mp307 grown under nonmulched, smooth surface conditions yielded 6899, 12105 and 8530 kg/ha in 1966, 1967, and 1968, respectively. An additional 1631, 251 and 1192 kg/ha were produced under the mulched, smooth condition during the 3 years. The late soil roughness treatment significantly reduced grain yields, probably because of root pruning and rapid evaporative losses after the roughening operation. Similar, but smaller, treatment responses were obtained for the Funks G732 cultivar. Mulched rough soil surface help minimize soil water deficits and, therefore, reduce the risk when growing a crop without irrigation.--Copyright 1973, Biological Abstracts, Inc.
W74-03515

EFFECTS OF REDUCING INTERPLANT COMPETITION FOR LIGHT AND WATER ON STALK ROT OF CORN,
Department of Agriculture, Harrow (Ontario). Research Station.
C. G. Mortimore, and L. F. Gates.
Can Plant Dis Surv. Vol 52, No 3, p 93-96. 1972.
Identifiers: *Corn stalk rot, Fungi, *Light, Resistance, Susceptibility, Water, Zea-Mays, *Plants (Water).

Stalk rot in resistant and susceptible corn (Zea mays) hybrids was studied under conditions of reduced interplant competition for light and water or for water only. A reduction in competition for both light and water decreased stalk rot by 64% and 20% in resistant and susceptible hybrids, respectively, when compared with plants for which stress conditions were not altered. Susceptible hybrids, especially in very dry periods, responded very little to reduced competition for water, and this appeared to limit their response to reduced competition for light. Resistant hybrids were more resilient than susceptible ones in that, when stress was decreased, they showed greater reductions in stalk rot. Susceptible plants tended to maintain yield at the expense of stalk deterioration and susceptibility to stalk rot.--Copyright 1973, Biological Abstracts, Inc.
W74-03516

A CONVENIENTLY CONSTRUCTED DIVISOR FOR SPLITTING LOW WATER FLOWS,
Cornell Univ., Ithaca, N.Y. Agricultural Experiment Station.
For primary bibliographic entry see Field 07B.
W74-03522

THE SIGNIFICANCE OF THE FALLOW YEAR IN THE DRY-FARMING SYSTEM OF THE GREAT KONYA BASIN, TURKEY,
Agricultural Univ., Wageningen (Netherlands). Dept. of Soils and Fertilizers.
B. H. Janssen.
Neth J Agric Sci, Vol 20, No 4, p 247-260, 1972, Illus.
Identifiers: Annual, *Dry farming, Fallow, Moisture, Nitrogen, Precipitation, Production, *Transpiration, *Turkey (Great Konya basin), *Wheat production.

The effect of the fallow year in the usual fallow-wheat rotation was studied. Between transpiration and dry matter production a linear relation was found. This relation in combination with the relations found between stored moisture and dry matter production allowed the calculation of the contribution of stored moisture to the wheat's transpiration in the crop year. The contribution of stored moisture proved essential. A tentative scheme is presented showing the coherence between annual precipitation and the necessity of fallow and of N dressing.--Copyright 1973, Biological Abstracts, Inc.
W74-03605

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

SOCIAL COSTS AND BENEFITS OF WATER RESOURCE CONSTRUCTION,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 06B.
W74-03204

LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 06F.
W74-03207

MULTIPLE OUTLET SELECTIVE WITHDRAWAL TECHNIQUE FOR WATER QUALITY PREDICTION OF LAKE RELEASES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05B.
W74-03218

HUMAN FACTORS INVOLVED IN THE DEVELOPMENT OF A WATERSHED IN YABUCOA,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
For primary bibliographic entry see Field 06B.
W74-03325

THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES,
Kentucky Water Resources Inst., Lexington.
J. P. Breaden.
Available from the National Technical Information Service as PB-227 216, $5.00 in paper copy, $1.45 in microfiche. Research Report No. 32, 1973. 150 p, 16 fig, 4 tab, 30 ref, 3 append. OWRR A-006-KY (13). 14-31-0001-3017.

Descriptors: *Flood control, *Flood damage, Flood frequency, Estimating, *Hydrograph analysis, Computer models, Computer programs, *Time series analysis, *Flood forecasting, *Simulation analysis, Depth-area-duration analysis, Reservoir operation.

There is a need in water resources planning to develop a procedure for determining the time pattern in which flood damages occur as a function of the rise and fall of the flood hydrograph. The widely-used approach for estimation of flood damages does not take into account the fact that the frequency of the annual flood peak may not be the same as the frequency of the total annual flood damages. As examples, several small storms during the year may do more damage than a single larger storm, or flood damages may be reduced by a reduction in flood duration rather than the flood peaks. A digital computer subroutine DAMAGE can be used to estimate the direct and indirect damages to property in the four basic categories of crop, field, urban, and public facilities as functions of the depth and duration of flooding, seasons, and the time laps between flood events. DAMAGE may be called with recorded or simulated annual hydrographs and used to analyze the time pattern of damages in the flood plain for optimizing the policies for operating reservoir flood control storage or for estimating the average annual damages for use in formulation of alternative flood control schemes. (Grieves-Kentucky)
W74-03334

DAMS AND RESERVOIRS IN TEXAS: PART II,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 08A.
W74-03375

OPTIMIZING WATER USE: THE RETURN FLOW ISSUE,
Colorado Univ., Boulder. School of Law.
For primary bibliographic entry see Field 06E.
W74-03385

STATEMENT FOR PUBLIC MEETINGS OF THE DEPARTMENT OF ARMY CORPS OF ENGINEERS CONCERNING THE REFORMULATION OF THE SIXES BRIDGE, DAM, AND LAKE PROJECT MARYLAND, AND THE VERONA DAM AND LAKE PROJECT, VIRGINIA,
Interstate Commission on the Potomac River Basin, Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-03386

A BILL TO ESTABLISH A NATIONAL FLOOD PLAIN POLICY.
For primary bibliographic entry see Field 06E.
W74-03394

A BILL AUTHORIZING THE CONSTRUCTION, REPAIR, AND PRESERVATION OF CERTAIN PUBLIC WORKS ON RIVERS AND HARBORS FOR NAVIGATION, FLOOD CONTROL, AND OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W74-03396

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 06F.
W74-03397

BANKLICK CREEK WATERSHED (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-03398

RECREATIONAL DEMAND AT LAKES AND RESERVOIRS,
Eno Foundation for Transportation, Inc. Saugatuck, Conn.
For primary bibliographic entry see Field 06D.
W74-03480

THE EFFECTS OF WATER CONSERVATION WORKS ON THE REGIME OF MORECAMBE BAY,
Hydraulics Research Station, Wallingford, (England).
F. J. T. Kestner.
The Geographical Journal, Vol 138, No 2, p 178-208, 1972. 18 fig, 7 plates, 6 ref.

Descriptors: *Tidal effects, *Feasibility studies, *Water conservation, *Water works, Model studies, Costs, Water resources development, Hydraulic structures, Water storage, Ocean currents, Estuaries, Harbors, Erosion, Bays, Reservoirs, Bottom sediments.
Identifiers: *Morecambe Bay (England), *Barrage.

The feasibility of using Morecambe Bay for water conservation was studied from January 1967 through the summer of 1971. Various engineering, economic, ecologic and social aspects involved in this large storage scheme were studied. The effects of these water conservation works in Morecambe Bay on tides, currents and the regime of sand in the areas seaward of the proposed works were investigated. Field work was carried out in the Bay and a large tidal model was constructed at Wallingford. The research indicated that a pumped storage scheme, consisting of reservoirs on Cartmel Warf and on the foreshore at Silverdale would not interfere with the regime of Morecambe Bay while a full, shore to shore barrage, and also a lesser scheme consisting of separate barrages further landward across the estuaries of the Kent and Leven rivers, would cause serious accretion at Morecambe and in Heysham Lake. Included is a discussion of the feasibility study by a panel of professors and engineers. (Slattery-Wisconsin)
W74-03483

FLOODPLAIN LANDS FOR PARKS AND RECREATION: A CASE STUDY OF MILWAUKEE,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 06B.
W74-03491

UPPER EEL RIVER DEVELOPMENT. INVESTIGATION OF ALTERNATIVE CONVEYANCE ROUTES,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 06B.
W74-03503

TECHNIQUES IN FORECASTING CONTENT OF ORGANIC AND BIOGENIC SUBSTANCES IN WATER OF EXISTING AND PROPOSED WATER BODIES (K METODIKE PROGNOZIROVANIYA SODERZHANIYA ORGANICHESKIKH I BIOGENNYKH VESHCHESTV V VODE SUSHCHESTVUYUSHCHIKH I PROYEKTIR UYEMYKH VODOYEMOV),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 02H.
W74-03535

MASS DEVELOPMENT OF HYDRURUS IN THE YENISEI BELOW THE KRASNOYARSK RESERVOIR DAM, (IN RUSSIAN),
Akademiya Nauk SSSR, Novosibirsk.
A. E. Kuz'mina.
Izv Sib Otd Akad Nauk SSSR Ser Biol Med Nauk. 1 p 54-56, 1972. (English summary).
Identifiers: Dams, Electric power, Hydro-electric power plants, *Hydrurus-Foetidus, Reservoirs, USSR (Yenisei River).

Investigations were conducted in the Yenisei river (USSR) below the Krasnoyarsk hydro-electric power station with purpose of ascertaining why the Krasnoyarsk water intakes are hindered. The appearance and mass development of H. foetidus in view of the change of hydrological regime of the examined part of the river appears to be the main cause of malfunction.--Copyright 1973, Biological Abstracts, Inc.
W74-03550

THE GREAT MIAMI RIVER CORRIDOR STUDY: A CONCEPT PLAN.
Kiley (Dan) and Partners, Charlotte, Vt.
For primary bibliographic entry see Field 06F.
W74-03631

CONTROL OF AQUATIC PLANT LIFE,
Pennwalt Corp., Philadelphia, Pa. (Assignee)
H. L. Lindaberry.
U.S. Patent No. 3,765,863, 5 p, 3 ref; Official Gazette of the United States Patent Office, Vol 915, No 3, p 986, October 16, 1973.

Descriptors: *Patents, *Algicides, *Algae, Euthrophication, *Aquatic weed control, *Aquatic fungi, Aquatic plants, Aquatic algae, Water pollution control.
Identifiers: Amine oxides.

Improved means are needed to effectively control the many varieties of undesirable weeds, fungi, and algae existing in ponds, lakes, or streams without harming desirable life forms. Certain amine oxide salts are used to chemically control unwanted aquatic plant life. Six examples are cited. Since the amine oxide salt is water soluble, it will diffuse out from the area treated. The preparation of the amine oxide salts of the 3,6-endoxohydrophthalic acids is readily carried out, without need of critical controls, simply by contacting the desired amine oxide with a stoichiometric amount of the desired 3,6-endoxohydrophthalic acid or anhydride. The temperature for the reaction will usually be between about 30 deg and 90 deg C. and the process is completed in a short time. Both the mono- and di-tertiary amine oxide salts of the acid may be prepared and used. To prepare the mono-salt the stoichiometric amount of amine oxide used will simply be one-half that

equired for the dibasic salt. All of the 3,6-endoxhydrophthalic acids and anhydrides may be used o form salts with the tertiary amine oxides. (Sin-a-OEIS)
W74-03653

WATER CONTROL APPARATUS RESPONSIVE TO LEAKAGE OR OVERFLOW CONDITIONS,
. F. O'Mera.
J.S. Patent No. 3,766,936, 4 p, 7 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 15, No 4, p 1265, October 23, 1973.

Descriptors: *Patents, *Leakage, *Overflow, Buildings, Water supply, *Water conservation, Equipment, *Domestic water, *Drainage.

Overflow water is received from any of a combination of areas in a building structure through a system of collection tubes. Water collected by the tubes is directed into a vessel which is pivotably supported by a shaft having electrical contacts fixed to one end. In a normal inoperative position, the vessel extends horizontally over the axis of the shaft. Counterweights, fixed to the vessel, extend from the other side of the axis to maintain the horizontal position of the vessel. The weight of water draining from the tubes into the vessel, however, upsets this balance and causes the vessel to pivot downwardly. This movement rotates the shaft, bringing the contacts into engagement with a pair of electrical connectors. This contact completes a circuit, operating a solenoid to close a gate valve in the main water supply. A second circuit is then completed by the moving contacts to activate an indicator located on a control panel. The water supply will remain closed until an attendant manually activates solenoids to reset the water control device and reopen the main water supply. Water drained through the collection tubes and the water control device during overflow is directed to the building's drainage system. (Sinha - OEIS)
W74-03663

CONTROLLING ALGAE WITH 5- (5 BARBITURILIDENE)-RHODANINE,
Gates Rubber Co., Denver, Colo. (assignee).
A. F. Kerst, J. D. Douros, Jr., and M. Brokl.
U.S. Patent No 3,765,864, 4 p; Official Gazette of the United States Patent Office, Vol 915, No 3, p 786, October 16, 1973.

Descriptors: *Patents, *Algae, Water treatment, Water supplies, Eutrophication, *Algicides, *Aquatic weed control, *Algal control, Aquatic algae, Aquatic plants, Water pollution control.
Identifiers: *Rhodanine compounds, Anabaena, Synura, Chlorella, Oscillatoria, Lyngbya, Chlamydomonas, Ankistrodesmus, Scenedesmus.

The presence of algae in water can result in such deleterious effects as rampant plant growth, health hazards, discoloration, bad taste and odor as well as blockage of pipes, filters, tanks and similar equipment. 5- (5'-barbiturilidene)-rhodanine compounds can be used to inhibit the growth of a wide variety of algae species which cause these problems in water supplies. For example 5- (5'-barbiturilidene)-rhodanine compounds may be employed against: (1) taste and odor causing algae such as Anabaena and Synura; (2) filter clogging algae such as Chlorella, Oscillatoria, and Anabaena; (3) polluted water algae such as Lyngbya, Chlamydomonas, Anabaena and Oscillatoria; (4) clean water algae such as Ankistrodesmus and (5) surface water algae such as Scenedesmus. (Sinha - OEIS)
W74-03665

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1974, PARTS 1 AND 2.
For primary bibliographic entry see Field 06E.
W74-03710

TROPICAL BAY IN DANGER,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 06G.
W74-03716

THE RIVER OF GRASS IS DRYING UP,
For primary bibliographic entry see Field 06G.
W74-03718

THE IMPERILED EVERGLADES,
For primary bibliographic entry see Field 06G.
W74-03720

THE WATER CYCLE ON A WATERSHED IN THE PALOUSE REGION OF IDAHO,
Bureau of Reclamation, Fresno, Calif.
D. J. Davis, and M. Molnau.
Transactions of the ASAE (American Society of Agricultural Engineers) Vol 16, No 3, p 587-589, 1973, 3 fig, 3 tab, 5 ref. OWRR A-029-IDA (2).

Descriptors: *Hydrologic cycle, *Idaho, *Watershed management, *Hydrologic data, *Water distribution (Applied), Evapotranspiration, Precipitation (Atmospheric), Surface runoff, *Water balance.

Distribution of water in the hydrologic cycle within the Palouse region of Idaho is becoming a concern of the people in the region. A few investigations have been made to determine the distribution of water, but most of these have resulted in only very rough estimates. During the 1969-70 water-year an approximate water balance fo a small agricultural watershed showed 25 in. of total precipitation was distributed 20% to runoff, 64% to evapotranspiration, and 16% to deep percolation. Some of the data used in this water balance were estimated or transposed rather than directly measured at the watershed. During the 1970-71 water-year improved instrumentation and procedures provided a better water balance. It was found that 27.5 in. of total precipitation was distributed 23% to surface runoff, 56% to evapotranspiration, 181/2% to deep percolation and 21/2% to an increase in soil moisture. All of these 1970-71 values are based on data collected at the watershed.
W74-03739

4B. Groundwater Management

INTEGRATED SYSTEM IDENTIFICATION AND OPTIMIZATION FOR CONJUNCTIVE USE OF GROUND AND SURFACE WATER PHASE I,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 02F.
W74-03201

UNDERGROUND WASTE MANAGEMENT AND ARTIFICIAL RECHARGE, VOLUMES 1 AND 2.
American Association of Petroleum Geologists, Inc., Tulsa, Okla.
For primary bibliographic entry see Field 05E.
W74-03222

SALINE AQUIFERS--FUTURE STORAGE RESERVOIRS FOR FRESH WATER,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 05E.
W74-03224

ARTIFICIAL RECHARGE IN UNITED KINGDOM WITH SPECIAL REFERENCE TO LONDON BASIN,
Water Resources Board, Reading (England).
R. L. H. Satchell, and W. B. Wilkinson.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 34-59, 1973. 10 fig, 2 tab, 8 ref.

Descriptors: *Artificial recharge, *Hydrogeology, *Groundwater basins, Mathematical models, Analog models, *Simulation analysis.
Identifiers: *London, England.

In England and Wales, about one-third of all public water supplies are taken from natural groundwater. In many places groundwater levels have been lowered extensively, causing saline intrusion and other problems. A hydrogeologic study was carried out to assess the potential for recharge beneath London. Over the last 170 years, groundwater levels have fallen, in some areas more than 250 ft, creating a storage volume exceeding 200 billion gal--about 5 times the total surface storage available in the Thames basin. An electric analog was constructed to assist in proving the transmissivity and storativity maps calculated from pumping test data obtained during the last 100 years. An engineering and economic investigation used 2 main techniques: (1) digital groundwater models of the selected recharge areas, and (2) a digital simulation, using 84 years of records of daily flows in the Thames. Additional yields of more than 70 mgd could be made available at low cost without the need of further surface storage. Field experiments involve the recharge of an existing Chalk well and adit system; in the other, water was injected into a pair of new wells, one open only to the Chalk and one open only to the Thanet Sands. (See also W74-03222) (Knapp-USGS)
W74-03225

UNDERGROUND WASTE DISPOSAL AND ARTIFICIAL RECHARGE IN JAPAN,
Tokyo Univ. of Education (Japan). Faculty of Science.
For primary bibliographic entry see Field 05E.
W74-03226

SUBSURFACE DISPOSAL OF LIQUID INDUSTRIAL WASTES IN ALABAMA--A CURRENT STATUS REPORT,
Geological Survey, University, Ala.
For primary bibliographic entry see Field 05E.
W74-03227

EFFECTS OF WASTE PERCOLATION OF GROUNDWATER IN ALLUVIUM NEAR BARSTOW, CALIFORNIA,
Geological Survey, Garden Grove, Calif.
For primary bibliographic entry see Field 05E.
W74-03228

ROLE OF BOREHOLE GEOPHYSICS IN UNDERGROUND WASTE STORAGE AND ARTIFICIAL RECHARGE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 05E.
W74-03229

FEASIBILITY STUDY OF A SEISMIC REFLECTION MONITORING SYSTEM FOR UNDERGROUND WASTE-MATERIAL INJECTION SITES,
Petty-Ray Geophysical Group, San Antonio, Tex.
For primary bibliographic entry see Field 05B.
W74-03230

HYDRAULIC FRACTURING AS A TOOL FOR DISPOSAL OF WASTES IN SHALE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05E.

W74-03231

SHORT-TERM EFFECT OF INJECTION OF TERTIARY-TREATED SEWAGE ON IRON CONCENTRATION OF WATER IN MAGOTHY AQUIFER, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 05C.
W74-03232

RADIOACTIVE- AND CHEMICAL-WASTE TRANSPORT IN GROUNDWATER AT NATIONAL REACTOR TESTING STATION, IDAHO: 20-YEAR CASE HISTORY AND DIGITAL MODEL,
Geological Survey, Idaho Falls, Idaho.
For primary bibliographic entry see Field 05B.
W74-03233

MODIFICATION OF ARTIFICIALLY RECHARGED WATER IN SWITZERLAND,
For primary bibliographic entry see Field 05B.
W74-03234

HYDRODYNAMICS OF MOUNT SIMON SANDSTONE, OHIO AND ADJOINING AREAS,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 05B.
W74-03235

DEDUCTION OF FLOW PATTERNS IN VARIABLE-DENSITY AQUIFERS FROM PRESSURE AND WATER-LEVEL OBSERVATIONS,
Illinois State Geological Survey, Urbana.
D. C. Bond.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 357-378, 1973. 4 fig, 10 ref.

Descriptors: *Groundwater movement, *Water levels, *Interfaces, *Hydrogeology, Aquifer characteristics, Gravity, Oil-water interfaces, Saline water-freshwater interfaces.

In previous potentiometric studies of variable-density aquifers, gravitational effects include the effects of troughs formed by permeability barriers within the aquifers and the effects of structural troughs, saddles, anticlines, and synclines. In intermontane regions these gravitational effects probably are negligible in comparison with observed head differences; in most other regions they can appreciably change the heads that are available to cause flow. A gradient in potential is not necessarily associated with flow, even though corrections are made for the average rate of change in density of water. Gravitational effects can cause the interface between water and an oil or gas deposit to be tilted, even if the water under the deposit is static. These effects can reduce the rate of flushing of brine by freshwater, or they can prevent flushing. (See also W74-03222) (Knapp-USGS)
W74-03236

UNDERGROUND STORAGE AND RETRIEVAL OF FRESH WATER FROM A BRACKISH-WATER AQUIFER,
Geological Survey, Norfolk, Va.
D. L. Brown, and W. D. Silvey.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 379-419. 1973. 12 fig, 5 tab, 13 ref.

Descriptors: *Artificial recharge, *Water storage, *Water chemistry, *Hydrogeology, Injection wells, *Virginia, Aquifer characteristics, Clay minerals, Ion exchange, Permeability, Specific capacity, Brackish water.
Identifiers: Norfolk (Va).

A study of injection of freshwater into a confined aquifer containing brackish water was undertaken to determine whether the host formation would accept large volumes of freshwater, to determine the degree of mixing of fresh and saline water, and to determine the percentage of recoverable freshwater after long periods of storage. In tests, freshwater was injected at a rate of 400 gpm. The specific capacity of the well decreased in one test from an initial value of 15.4 gpm/ft of drawdown to 9.3 gpm/ft after 260 minutes of injection. The other tests had similar results. The reduction in flow rate and specific capacity was due to a uniform reduction in permeability throughout the aquifer. Loss of specific capacity was due to clay dispersion. Chemical data indicated that the sodium-rich clays were involved in cation exchange. During injection, calcium and magnesium replaced sodium on the clays. During withdrawal, this reaction was reversed. The net effect of the cation exchange was to decrease very slightly the tendency of the clays to disperse during injection. Chemical treatment was tested to decrease or eliminate clay dispersion. A preflush of 3,000 gal of 0.2 normal calcium chloride was injected before the freshwater. A maximum injection rate could be maintained by injecting for periods of 1,200 and 1,400 minutes, then withdrawing water for 30 minutes to clear the injection zones. A total of 20 million gal of freshwater was injected. The water was left in the aquifer for about 8 weeks before beginning the withdrawal phase. About 85% of the injection water could be recovered. (See also W74-03222) (Knapp-USGS)
W74-03237

RETENTION OF DISSOLVED CONSTITUENTS OF WASTE BY GEOLOGIC MEMBRANES,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 05B.
W74-03238

HYDROGEOLOGIC STUDIES AT A SUBSURFACE RADIOACTIVE-WASTE-MANAGEMENT SITE IN WEST-CENTRAL CANADA,
Waterloo Univ. (Ontario). Dept. of Earth Sciences.
For primary bibliographic entry see Field 05E.
W74-03239

MOVEMENT AND ACCUMULATION OF SUSPENDED SEDIMENT DURING BASIN RECHARGE,
Southwestern Great Plains Research Center, Bushland, Tex.
D. W. Goss, and O. R. Jones.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 468-478, 1973. 5 fig, 2 tab, 12 ref.

Descriptors: *Artificial recharge, *Sedimentation, *Pit recharge, Turbidity, Permeability, Infiltration, Recharge ponds, Silting, Water spreading.

The movement and accumulation of sediment suspended in water used for recharge were determined by microscopic examination of thin sections from material underlying a recharge basin. The basin had been infiltrated to the depth of 91 m by water averaging 191 ppm suspended sediment in six recharge cycles. Flakelike structures were found on the upper 2.5 cm. Two horizontal sheetlike structures, 0.1 mm thick, were found between the depths of 5-8 and 8-12 cm. Fillings in voids, mostly between 2.5 and 23 cm were filled. The average pore volume lost between the depths of 2.5 and 5 cm was 1.5%, and, below 5 cm, less than 1%. Porosity was maintained by freezing and thawing and by wetting and drying. Infiltration rates of the basin have not been noticeably reduced. The successful use of excavated basins for recharge of turbid water should not be limited by the movement and accumulation of suspended sediment in the basin material. (See also W74-03222) (Knapp-USGS)
W74-03240

GEOHYDROLOGY OF BURIED TRIASSIC BASIN AT SAVANNAH RIVER PLANT, SOUTH CAROLINA,
Du Pont De Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 05E.
W74-03241

ARTIFICIAL RECHARGE OF TREATED WASTE WATERS AND RAINFALL RUNOFF INTO DEEP SALINE AQUIFERS OF PENINSULA OF FLORIDA,
Black, Crow and Eidsness, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 05E.
W74-03242

INJECTION OF ACIDIC INDUSTRIAL WASTE INOT A SALINE CARBONATE AQUIFER: GEOCHEMICAL ASPECTS,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05E.
W74-03243

HYDROLOGIC EVALUATION OF INDUSTRIAL-WASTE INJECTION AT MULBERRY, FLORIDA,
Geological Survey, Tampa, Fla.
For primary bibliographic entry see Field 05E.
W74-03244

CASE HISTORY OF SUBSURFACE WASTE INJECTION OF AN INDUSTRIAL ORGANIC WASTE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 05E.
W74-03245

ROLE OF BACTERIA IN DECOMPOSITION OF INJECTED LIQUID WASTE AT WILMINGTON, NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-03246

HISTORY OF A TWO-WELL INDUSTRIAL-WASTE DISPOSAL SYSTEM,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 05E.
W74-03247

SUBSURFACE DISPOSAL OF WASTE IN KANSAS,
Kansas State Dept. of Health, Topeka.
For primary bibliographic entry see Field 05E.
W74-03248

SITE INVESTIGATIONS FOR A BEDDED-SALT PILOT PLANT IN PERMIAN BASIN,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05E.
W74-03249

DEEP-WELL INJECTION OF DESALTING-PLANT WASTE BRINE,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 05E.
W74-03250

GEOCHEMICAL HYDROLOGY OF THE BATON ROUGE AQUIFERS,
Louisiana State Univ., Baton Rouge. School of Geoscience.
R. A. Khan, R. E. Ferrell, Jr., and G. K. Billings.
Available from the National Technical Information Service as PB-227 087, $3.25 in paper copy, $1.45 in microfiche. Louisiana Water Resources

Research Institute, Baton Rouge, Bulletin 8, 1972. 63 p, 14 fig, 5 tab, 48 ref. OWRR A-010-LA (2).

Descriptors: *Groundwater, *Geochemistry, *Physicochemical properties, *Ion exchange, *Bicarbonate, *Chlorides, *Sodium, Hydrogeology, Ion transport, Diagenesis, Groundwater barriers, Regression analysis, Correlation analysis, Permselective membranes, Magnesium, *Potassium, Water softening, Natural recharge, Mixing, Solvate, *Louisiana.
Identifiers: *Baton Rouge (La), Hydrochemical facies, Hydrochemical mapping.

Regression analyses of dissolved chemical content in fresh water from the Baton Rouge aquifers show that the sodium, calcium, and magnesium abundances are functions of the distance from the area of intensive industrial withdrawals and the depth of the well screen. However, a new way of describing the hydrochemical facies gives a better indication of dynamic conditions. For each samples, the cations and anions that constitute 5 percent or more of the total epm value were listed in order of decreasing abundance and the water is classified on this basis. Apparently, the Baton Rouge fault is the only geologic structural feature with any influence on the distribution of the hydrochemical facies. Primary recharge of the aquifers occurs through infiltration of Mississippi River water, with possible slight mixing of water from the Amite and Comite Rivers. Under the industrial area, selective membrane filtration through the deep, compacting clay aquitards, along with ion exchange in the aquifers, has brought about sodium and carbonate enrichment. The offtake of ground water has accelerated the process. In the shallow aquifers, carbonate enrichment has resulted from the solution of calcite and dolomite. The high chloride content of some aquifers apparently stems from dilution of connate saline water.
W74-03335

EFFECT OF FORMATION DIP ON THE MOVEMENT OF FRESH WATER STORED IN SALINE AQUIFERS,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
O. K. Kimbler.
Available from the National Technical Information Service as PB-226 946, $3.00 in paper copy, $1.45 in microfiche. Completion Report, April 5, 1972. 7 p, 1 fig, 4 ref. OWRR A-011-LA (2). 14-31-0001-3218.

Descriptors: *Injection wells, *Natural gas, *Storage capacity, *Hydrofracturing, *Aquifers, Model studies, Mathematical studies, Secondary recovery (Oil), Oil reservoirs, Aquifer characteristics, Pores.
Identifiers: *Saline aquifers.

A fluid flow model was used to investigate the importance of viscous fingering in a radial system. Viscous fingering at unfavorable viscosity ratios (low viscosity fluid displacing higher viscosity fluid) led to extreme irregularities in the displacement front. It was postulated that the study would indicate the effect which gross aquifer inhomogeneities might have on the recovery efficiency during the storage process. A series of displacements in which the low viscosity fluid was injected to a given radius and then produced lack through the same well showed that extreme irregularities of the front developed during injection but irregularities were essentially erased during the production half-cycle. It was found that the 'finger' growth was retarded by large mixed zones. The 'fingers' were erased during the production half-cycle in almost exactly the reverse of the manner in which they formed during injection. Thus, they would have little effect on recovery efficiency in a water storage project. This conclusion is based on the assumption that the fingers are sufficiently broad that transverse dispersion is of little consequence. If the assumption is valid that viscous fingering may, as a first approximation, be used as an analog to frontal irregularity resulting from aquifer heterogeneity, the results suggest that certain types of heterogeneity may not adversely affect recovery efficiency.
W74-03336

VERIFICATION OF GROUNDWATER CAPITAL COSTS,
New Hampshire Univ., Durham. Water Resources Research Center.
R. H. Forste.
Available from the National Technical Information Service as PB-226 982, $3.00 in paper copy, $1.45 in microfiche. Technical Working Paper No. 2, March 1973. 15 p, 2 tab, 5 ref. OWRR A-028-NH (2). 14-31-0001-3529.

Descriptors: *Groundwater, Aquifers, Economics, Least Squares Method, Coastal Plains, Rocks, *Capital costs, *Operating costs, Model studies, Water wells, Regression analysis, Groundwater mining, Glacial sediments.
Identifiers: *Multiple Well Systems, Capital cost models, Consolidated rocks.

The objective of this study was to determine if a model could be specified that would be of use to planners when installing or expanding wellfields to provide additional water. Wells and associated equipment vary in terms of cost and complexity, depending upon capacity and depth of the well. Both capital costs and operating cost components are of importance. Since these cost factors vary as to location and since geological formations will affect capital costs, cost data as a guide to planning a water supply system are not readily available. A model was developed, dealing only with the capital costs of well installation. Parameters of the model were estimated by least squares. Although the model yielded an extremely high coefficient of multiple determination, the predictive value of the model was rebutted. This rejection indicates that some important variables were omitted. Several methods of specifying these omissions were suggested. In terms of policy and/or planning, the model has not been adequately tested to determine its predictive value.
W74-03338

PROPOSED MUNICIPAL WASTE WATER--GROUNDWATER EXCHANGE, CITY OF TUCSON: AVRA-MARANA VALLEY.
Arizona Water Resources Research Center, Tucson; and Arizona Agricultural Experiment Station, Tucson.
For primary bibliographic entry see Field 05G.
W74-03340

ARTIFICIAL RECHARGE--STATE OF THE ART,
Geological Survey, Lubbock, Tex.
R. F. Brown, and D. C. Signor.
In: Underground Waste Management and Artificial Recharge Vol 2, p 668-686, 1973. 48 ref.

Descriptors: *Artificial recharge, *Waste disposal wells, *Reviews, Water spreading, Indection wells, Underground waste disposal, Induced infiltration, Mathematical models, Pit recharge, Recharge ponds.

The largest potential reservoir for the storage of potable water is in the unsaturated zone. Artificial recharge has many similarities to liquid-waste disposal through deep wells. In both, the problem is to place liquid in a permeable lithologic unit at an economic rate, to predict movement and the chemical reactions and physical changes that take place while the liquid is in the reservoir. Water commonly is recharged by surface spreading through basins or by induced recharge from adjacent streams and lakes or through injection wells. Research in recharge through basins has been dominated by mathematical models based on idealized conditions and empirical relations, derived by experimental sequencing of recharge operations, and operational controls in the pretreatment of recharge water. Recharge by injection wells has been undertaken in a variety of hydrologic environments. In Israel efforts have been directed toward the analyses of diffusion and dispersion of the injected water. Much research in the United States has been directed toward the movement of bacteria and organic matter through an aquifer and toward the chemical modeling of changes in recharged water as it moves. Interdisciplinary teams should consider the geologic, hydraulic, geochemical, bacteriologic, engineering, geophysical, and economic aspects of the system. (See also W74-03222) (Knapp-USGS)
W74-03354

INDUSTRIAL WASTEWATER-INJECTION WELLS IN UNITED STATES--STATUS OF USE AND REGULATION, 1973,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W74-03355

ARTIFICIAL RECHARGE OF COASTAL-PLAIN AQUIFER IN ISRAEL,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Div. of Hydrology.
A. Sellinger, and S. H. Aberbach.
In: Underground Waste Management and Artificial Recharge, Vol 2, p 701-714, 1973.

Descriptors: *Artificial recharge, *Injection wells, *Water spreading, Pit recharge, Water wells, Hydrogeology, Aquifer characteristics, Water yield.
Identifiers: *Israel, Well clogging, Well development.

The coastal-plain aquifer is one of the main groundwater sources in Israel. At present it is recharged through 100 wells and 7 spreading grounds with a total area of 265 acres. The average yearly rate of recharge is about 80 million cu m per year. Recharge is practiced mostly during winter months, November through March, and sometimes also during April and October. The main source is Lake Kinneret, supplying 68% of the recharged water; about 17% is storm runoff and 15% is groundwater withdrawn from a limestone aquifer. A decrease in well recharge rates is observed when single-purpose wells (unequipped wells drilled for recharge only) are recharged with Lake Kinneret water. Redevelopment of these wells over a short period does not restore the original recharge rates. The same Lake Kinneret water, when recharged into dual-purpose wells causes only a small decrease in the recharge rate. In the dual-purpose wells, the first batch of water pumped after recharge is contaminated. This contamination (odor, turbidity, and high counts of coliform bacteria) probably is due to the high content of organic matter in the recharged water. To assist in restoring infiltration recharge rates, basins are dried out after each season, the upper layer of soil and silt removed, and the basin cultivated. This results generally in restoration of the infiltration rates to their original values. (See also W74-03222) (Knapp-USGS)
W74-03356

HAZARDS OF WASTE DISPOSAL IN GROUNDWATER BASINS,
Geological Survey, Sacramento, Calif.
For primary bibliographic entry see Field 05E.
W74-03357

ASSE SALT MINE, FEDERAL REPUBLIC OF GERMANY--OPERATING FACILITY FOR UN-

DERGROUND DISPOSAL OF RADIOACTIVE WASTES,
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Neuherberg bei Munich West Germany. Institut fuer Stratigraphie.
For primary bibliographic entry see Field 05E.
W74-03358

DAN REGION, ISRAEL, SEWAGE-RECLAMATION AND RECHARGE PROJECT,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Div. of Hydrology.
For primary bibliographic entry see Field 05D.
W74-03359

LABORATORY FACILITY FOR STUDIES RELATED TO ARTIFICIAL RECHARGE,
Geological Survey, Lubbock, Tex.
D. C. Signor.
In: Underground Waste Management and Artificial Recharge, Vol 2, p 799-822, 1973. 13 fig, 1 tab, 29 ref, append.

Descriptors: *Artificial recharge, *Laboratory tests, Infiltration, Percolation, Groundwater movement, *Permeability, Water spreading, Injection wells, *Porous media, Aquifer testing.

Flow can be induced through repacked or field cores under contant flow or constant pressure. A flow-test data-aquisition and computation system provides punched-tape data storage and real-time computation and plotting of intrinsic permeability changes with column depth and time. Water-quality data are recorded during the test, and characteristics of the porous media and suspended solids are determined. Accumulation of material in porous-media interstices is observed visually with a scanning electron microscope. A U. S. Geological Survey laboratory facility at Lubbock, Texas, was designed and equipped to provide a means of testing flow through porous-media columns. Artificial groundwater recharge is subject to limitations caused by mechanisms which degrade the hydraulic conductivity of the porous media. Reduction of hydraulic conductivity may be caused by suspended solids, bacterial growth, chemical reaction of dissolved solids with the porous media or native water, and air entrainment or dissolution of gases in the interstices of the porous medium. (See also W74-03222) (Knapp-USGS)
W74-03360

HYDROGEOLOGY OF SUBSURFACE LIQUID--WASTE STORAGE IN FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05E.
W74-03361

FEASIBILITY STUDY OF LIQUID-WASTE INJECTION INTO AQUIFERS CONTAINING SALT WATER, WILMINGTON, NORTH CAROLINA,
North Carolina Dept. of Natural and Economic Resources, Wilmington. Office of Water and Air Resources.
For primary bibliographic entry see Field 05E.
W74-03362

USE OF FINITE-DIFFERENCE ARRAYS OF OBSERVATION WELLS TO ESTIMATE EVAPOTRANSPIRATION FROM GROUND WATER IN THE ARKANSAS RIVER VALLEY, COLORADO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02D.
W74-03508

RENOVATING SEWAGE EFFLUENT BY GROUND WATER RECHARGE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 05D.
W74-03520

ENGINEERING DESIGN CRITERIA FOR SPRAY IRRIGATION,
Bishop (William), Tallahassee, Fla.
For primary bibliographic entry see Field 05D.
W74-03521

WATER STUDY, SANTA FE PLANNING AREA.
Santa Fe City Planning Dept., N. Mex.

January, 1972. 59 p, 10 fig, 1 tab.

Descriptors: *Water supply, *Water demand, *Groundwater, *Municipal water, Water resources, Environmental effects, Costs, Urban land use, Groundwater availability, Groundwater mining, Groundwater recharge, *New Mexico, Urbanization, Surface waters, Surface-groundwater relationships, Pumping, Wells, Supply, Rio Grande River.
Identifiers: Future growth, *Urban growth, Utility extension, Santa Fe (N. Mex.), Santa Fe River.

There are limiting factors to the continued pumping of local wells at their present rates. This points to greater reliance upon water imported from the Rio Grande and the proposed Buckman wells, for the future growth and orderly development of Santa Fe whose projected water use by the year 2000 could reach an estimated 25,200 acre feet per year, outstripping available supplies within 15 years. By that time the city must resist pressures to extensively mine the ground water reservoir, extend public water service to far outlying areas, and develop expensive means to provide city water. The present situation suggests that the city and county need to: (a) adopt local regulations and policies controlling additional use of ground water and the expansion of public water service; (b) undertake immediate studies to quantify ground water limitations and find means of securing a water supply at a reasonable cost for the next 20 to 50 years; (c) study the cost and benefits of the city purchasing the water system; (d) purchase permanent water rights from Buckman, and determine production and cost estimates for Buckman well fields; (e) explore the alternative to construction of a filter plant; (f) reduce dependence on ground water use in the Santa Fe well fields; and (g) actively explore ways to find new and improved sources of water at a reasonable cost for a 50 year period, in order to demonstrate that continued population growth will not be detrimental to Santa Fe's environment and economy. Means of securing the necessary water supply, the reduction of groundwater depletion, and the preparation of detailed water studies are discussed. (Edwards-North Carolina)
W74-03641

2020 PLAN, BOARD OF WATER SUPPLY/CITY AND COUNTY OF HONOLULU.
Honolulu City and County Board of Water Supply, Hawaii.

February, 1971. 77 p, 28 fig, photos, append.

Descriptors: *Water supply, *Groundwater mining, *Groundwater, *Hawaii, *Water demand, *Projections, Planning, Inter-basin transfers.
Identifiers: Honolulu (Hawaii), *Oahu, Caprock.

Water demand for the island of Oahu can be met indefinitely by tapping groundwater sources on the island. Extremely heavy rainfall falls on the higher elevations and percolates rapidly into porous rock to accumulate in underground aquifers. Stored water moves toward the sea, but is trapped by relatively impermeable sediments, or caprock. The fresh water forms a vast lens floating on heavier saline water. By means of wells and shafts, water may be pumped to the surface for use. Portions of the rainfall are trapped by nearly impervious dikes at higher elevations where it remains until it seeps away by springs or is drained by tunnels. The island's population is projected to rise from 579,000 in 1970 to 1,500,000 in 2020. Daily water consumption will rise from 102 m.g.d. to 253 m.g.d. More wells and shafts will be needed. The island is divided into nine watersheds for which population, water consumption, and new sources have been projected. Projects are marked for completion by either 1985 or 2020. All watersheds have adequate developable water supplies except the city of Honolulu area. Consequently, water will be imported from other parts of the island. A diagram illustrates developable water supplies in 1980 for each watershed, local demand, and water exports. The uncertainties of population projections are noted. Speculations are made as to the feasibility of utilizing desalinzed sea water, surface water, brackish groundwater, and reclaimed wastewater. (Stein-North Carolina)
W74-03649

4C. Effects on Water of Man's Non-Water Activities

WATERFOWL HABITAT TRENDS IN THE ASPEN PARKLAND OF MANITOBA,
W. H. Kiel, Jr., A. S. Hawkins, and N. G. Perret.
Can Wildl Serv Rep Ser. 18, p 8-61, 1972. Illus.
Identifiers: Aspen, *Canada (Manitoba), Drainage, Ducks, Fall, Grain, *Land use, Migration, Parkland, *Potholes, Trends, *Waterfowl habitats.

Natural and man-made changes in waterfowl habitat in the 4100 sq mi Minnedosa district of the aspen parkland of Mannitoba, Canada, are described. Following historical review, the study area and methods, the changing nature of habitat and future considerations are discussed. Road building, land clearing and drainage are affecting potholes at an increasing rate. The Minnedosa district has the potential to contribute at least 1 million ducks to the fall migration. The economy of the region is largely dependent on cereal grain production, and the future of the parkland rests with the landowner.--Copyright 1973, Biological Abstracts, Inc.
W74-03517

LOWER WATER TEMPERATURES WITHIN A STREAMSIDE BUFFER STRIP,
Forest Service (USDA), Asheville, N.C. Southeastern Forest Experiment Station.
L. W. Swift, Jr., and S. E. Baker.
USDA Forest Service Research Note SE-193, April 1973. 7 p, 4 fig, 6 ref.

Descriptors: *Water temperature, *Trout, *Clearcutting, *Riparian plants, *Riparian waters, *Lumbering, Temperature, Shrubs, Trees, Water properties, Fish, Streams, Rivers, Freshwater, Freshwater fish, Thermal pollution, Vegetation effects, *North Carolina.

The removal of streamside vegetation increases the water temperature in mountain streams. Clearcutting and farming have been found to raise temperatures beyond the tolerance level for trout (68F). Within the timber sale area of a commercial clearcut in the North Carolina mountains, a narrow buffer strip of uncut trees and shrubs was left beside a stream. Although water temperatures within the area may have exceeded 68F, the stream immediately below the sale area was never warmer than 62F. (Brown-IPC)
W74-03551

EFFECTS OF HIGHWAYS ON SURFACE AND SUBSURFACE WATERS,
Southeastern Massachusetts Univ., North Dartmouth. Dept. of Civil Engineering.
S. D. Khanna.
Public Works, Vol 104, No 11, p 71-73, 123-124, November 1973. 2 fig.

Descriptors: *Highway effects, *Subsurface waters, *Surface waters, Runoff, Storm drains, Water resources, Channels, Flood control, Flood plains, Groundwater, Water quality, Recreation, Erosion, Sedimentation, Road construction.
Identifiers: Channel relocation.

The construction of highways can create serious environmental problems in surface and subsurface waters. Such problems need to be identified and solutions considered during the design and location stage of highway construction. Several general problem areas are discussed and solutions are offered to either minimize detrimental effects or maximize beneficial effects. The general problem areas considered are: (1) quantity of water, (2) water resources projects, (3) storm drainage systems, (4) channel relocations, (5) flood controls and flood plains, (6) groundwater, (7) water recreation, (8) community utilities, and (9) water quality. (Mortland-Battelle)
W74-03607

NATURAL FEATURES ELEMENT OF THE COMPREHENSIVE PLAN: A PLAN FOR ACTION.
DeKalb County Planning Dept., Decatur, Ga.

June, 1973. 16 p, 3 tab, append.

Descriptors: *Environmental effects, *Urbanization, *Planning, *Gorgia, *Comprehensive planning, Natural resources, Land use, Soils, Geology, Hydrology, Water Resources.
Identifiers: DeKalb County (Ga.), Open space, Interdisciplinary studies, Land use control, Gwinnett County (Ga.), Newton County (Ga.), Rockdale County (Ga.).

Rapid urbanization in DeKalb County is infringing on open space areas and has significant impacts on the natural environment, e.g. changing surface runoff and stream water quality. An approach is outlined for studying the impacts of urbanization, the capability of open areas to withstand these impacts, the best intensity levels of urban development for certain land areas, and the control of the urbanization process. These studies will be interdisciplinary involving planning departments, public works departments, the Soil Conservation Service, the Corps of Engineers, the U.S. Geological Survey, private groups, and consultants. Three basic goals related to protecting the environment are identified. Specific policies and action proposals for each goal are embodied in the outlined process for analysis: (1) an inventory of pertinent natural resources; (2) a synthesis of the interrelationships among these resources; and (3) an evaluation of the impact on the natural resources when subjected to various land uses and densities of development. Elements to be included in the natural resources inventory are soils, landforms, geology, topography, hydrology, water quality, climatology, vegetation, and wildlife. (Elfers - North Carolina)
W74-03633

CONSERVATION-OPEN SPACE PLAN; AMENDMENTS TO THE SPRINGFIELD COMPREHENSIVE PLAN.
Springfield Planning Dept., Mass.
For primary bibliographic entry see Field 03D.
W74-03634

METROPOLITAN DEVELOPMENT GUIDE: PROTECTION OPEN SPACE--POLICY PLAN, PROGRAM.
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 06G.
W74-03635

4D. Watershed Protection

PROCEEDINGS, MISSISSIPPI WATER RESOURCES CONFERENCE, 1973.
Mississippi State Univ., State College. Water Resources Research Inst.
For primary bibliographic entry see Field 05B.
W74-03212

SEDIMENT YIELD ESTIMATES BASED ON FLOODWATER MEASUREMENTS AND SAMPLES,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 02J.
W74-03214

ENVIRONMENTAL ASPECTS OF WATERSHED PLANNING,
Soil Conservation Service, Jackson, Miss.
For primary bibliographic entry see Field 06G.
W74-03215

MONITORING NUTRIENT LOSSES FROM SMALL WATERSHEDS,
Tennessee Valley Authority, Muscle Shoals, Ala. Soils and Fertilizer Research Branch.
For primary bibliographic entry see Field 05B.
W74-03219

BANKLICK CREEK WATERSHED (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from NTIS, U.S. Dep't of Commerce, as EIS-KY-73-0656-F, for $5.50 paper copy. March 1973. 62 p, 2 map, 1 append.

Descriptors: *Water pollution effects, *Environmental effects, Structures, Ecology, Environmental control, Projects, Project planning, Water resources, *Kentucky, Channel improvement.
Identifiers: *Environmental Impact Statement, Boone and Kenton Counties, Ky.

This plan was prepared under the authority of the watershed protection and flood prevention act. The summary of environmental impacts and adverse environmental effects showed that project measures are estimated to be favorable although the project is expected to adversely affect the environment by interrupting or limiting agriculture, creating potential inconvenience to residents, affecting the ecology of streams in reservoir areas, increasing erosion, and creating problems associated with increased economic activity. Alternatives considered were nonstructural measures, structural measures, multiple purpose structures, channel work, and no action at all. (Daniels-Florida)
W74-03398

AMERICAN FALLS DAM, UPPER SNAKE RIVER PROJECT, IDAHO.
For primary bibliographic entry see Field 06E.
W74-03419

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

SENSITIVITY OF VERTEBRATE EMBRYOS TO HEAVY METALS AS A CRITERION OF WATER QUALITY,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 05C.
W74-03206

SOME DATA ON FLUORINE, BROMINE, AND IODINE CONCENTRATIONS IN ATMOSPHERIC PRECIPITATION AT VORONEZH (NEKOTORYYE DANNYYE O SODERZHANII FTORA, BROMA I IODA V ATMOSFERNYKH OSADKAKH G. VORONEZHA),
Voronezhskii Lesotekhnicheskii Institut (USSR).
N. G. Barkalova.
In: Formirovaniye khimicheskogo sostava poverkhnostnykh vod i metody ikh analiza: Gidrokhimicheskiey Materialy, Vol 57, p 3-9, 1973. 2 tab, 23 ref.

Descriptors: *Water chemistry, *Fluorine, *Bromine, *Iodine, *Precipitation (Atmospheric), Rain, Snow, Frost, Inorganic compounds, Salts, Ions.
Identifiers: *USSR (Voronezh), Mineralization.

Fluorine, bromine, and iodine concentrations in atmospheric precipitation and hoarfrost were investigated at Voronezh in central Soviet Russia between March 5, 1969 and March 4, 1970. The chemical composition of atmospheric precipitation is of the calcium- or sodium-bicarbonate type. The chemical composition of hoarfrost waters is of the calcium-or sodium-sulfate type. Total mineralization varies between 8.10 and 53.71 mg/liter. The fluorine concentration in all precipitation samples varies between 0.06 and 0.54 mg/liter. Snow and rainwaters contain an average of 0.20 and 0.14 mg of fluorine/liter, respectively. Main sources of fluorine in precipitation are dust and aerosol particles rising from the earth's surface, and products of winter fuel combustion. Bromine and iodine concentrations in precipitation reach 0.029 and 0.013 mg/liter, respectively, averaging 0.012 mg of bromine/liter and 0.002 mg of iodine/liter. Variations in concentrations of bromine and iodine in snow and rainwaters are small. Fluorine and bromine concentrations in hoarfrost are twice as high as those in snow and rainwaters. Average concentration of fluorine in hoarfrost is 0.36 mg/liter and in snow and rainwaters is 0.16 mg/liter. Average concentration of bromine in hoarfrost is 0.020 mg/liter and in snow and rainwaters is 0.011 mg/liter. No iodine was detected in hoarfrost. Higher concentrations of fluorine and bromine in hoarfrost may be due to the presence of a large city and its highly developed industrial complex. (Josefson-USGS)
W74-03251

TRACE ELEMENTS IN BOTTOM SEDIMENTS OF DNIEPER RIVER RESERVOIRS (MIKROELEMENTY V DONNYKH OTLOZHENIYAKH VODOKHRANILISHCH R. DNEPRA),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 02K.
W74-03254

HYDROCHEMICAL DESCRIPTION AND CALCIUM-CARBONATE EQUILIBRIUM OF SHUMAK CARBONATE WATERS (GIDROK-

HIMICHESKAYA KHARAKTERISTIKA I KARBONATNO-KAL'TSIYEVOYE RAVNOVESIYE SHUMAKSKIKH UGLEKISLYKH VOD),
Irkutskii Gosudarstvennyi Universitet (USSR).
For primary bibliographic entry see Field 02K.
W74-03256

BOTTOM MACROFAUNA IN THE GOCZALKOWICE DAM RESERVOIR IN THE YEARS 1965-1969,
Polish Academy of Sciences, Pszczyna. Hydrobiological Station.
For primary bibliographic entry see Field 05C.
W74-03271

THE MICROCALORIMETRY OF MICROBIAL GROWTH,
J. M. Jones.
Process Biochemistry, Vol 8, No 9, p 19-20, September 1973. 3 fig, 1 ref.

Descriptors: *Bacteria, *Monitoring, *Growth rates, *Heat, Cultures, Laboratory equipment, Growth stages.
Identifiers: *Microcalorimetry.

A flow microcalorimeter has been used to monitor the heat production of bacterial cultures. In the calorimeter, solutions are pumped through cells which are situated in a sandwich of semiconductor thermopiles and a heat sink. Heat transferred across the thermopiles produces a small voltage directly proportional to the heat. Plots of actual and integrated heat output, glucose concentration, acetate concentration, and cell concentration versus time show that thermograms reveal two distinct phases in growth patterns: (1) the exponential growth phase and (2) the phase in which acetate produced in phase 1 is consumed. Therefore, heat output can be used to describe the separate phases of growth processes. Several applications of the technique are suggested such as monitoring of fermentation processes, production of antibiotics, and reactions to antibiotics. (Little-Battelle)
W74-03273

SOME ARCTIC LIMNOLOGY AND THE HIBERNATION OF INVERTEBRATES AND SOME FISHES IN SUB-ZERO TEMPERATURES,
Naturhistoriska Riksmuseet, Stockholm (Sweden). Section for Invertebrate Zoology.
For primary bibliographic entry see Field 02H.
W74-03275

AN IN SITU EXAMINATION OF THE GRAZING ACTIVITIES OF NATURAL ZOOPLANKTON COMMUNITIES,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-03276

A LIMNOLOGY STUDY OF A HIGH MOUNTAIN LAKE IN MOUNT RAINIER NATIONAL PARK, WASHINGTON STATE; USA,
Washington Univ., Seattle. Fisheries Research Inst.
G. L. Larson.
Archiv fur Hydrobiologie, Vol 72, No 1, p 10-48, June 1973. 26 fig, 14 tab, 47 ref.

Descriptors: *Photoplankton, *Primary productivity, Benthic fauna, *Seasonal, *Zooplankton, Water quality, *Rotifers, *Dinoflagellates, Pigments, Crustaceans, Diatoms, Cyanophyta, Chlorophyta, Protozoa, Water analysis, Biomass, Trophic level, Population, Alkalinity, Hydrogen ion concentration, Dissolved oxygen, Nitrogen, Phosphorus, Color, Dissolved solids, Water temperature, Electrical conductance, Oligochaetes, Diptera, *Washington, Sampling.
Identifiers: Mowich Lake (Wash.), Macroinvertebrates, Transparency, Eucyclops agilis, Kellicottia longispina, Keratella hiemalis, Keratella cochlearis, Collotheca pelagica, Collotheca libera, Conochilus unicornis, Pisidium, Notholca squamata, Polyarthra, Encentrum, Melosira distans, Synedra ulna, Gomphonema olivaceum, Diatoma hiemale, Eunotia robusta.

Mowich Lake, a high mountain lake in the Western Washington State Cascade Mountains, was studied from March to November 1967 to determine biotic relationships. Alkalinity, pH, oxygen, N, P, color, dissolved solids, temperature, transparency, conductance and primary production were determined. Phytoplankton samples were collected, enumerated, and extractable pigments determined. Zooplankton were collected from 7 depths, counted, and reproductive rates calculated. Macrobenthos was sampled at 5 depths. In general, the lake was low in mineral content and unproductive. The winter lake cover appeared to play an important role in primary production by way of nutrient additions. Primary production, extractable phytoplankton pigments and total phytoplankton biomass were strongly correlated in both time and space, and were maximal in July. The maximum primary production was 152/sq m and 21/cu m mg C assimilated per day. Maximum phytoplankton biomass was 32/sq m and 1.7/cu m gm fresh weight. The activity quotient ((mg C assimilated/sq m/day)/ (mg phytoplankton biomass/sq m)) indicated the primary production of Mowich Lake to be in the oligotrophic range. The zooplankton community consisted of eight species of Rotifera. The only crustacean, Eucyclops agilis, was occasionally taken pelagically, but was usually confined to littoral and benthic regions. Zooplankton populations were maximal between early October and mid-November. The egg ratio reproductive rate, B (eggs/female/day), was maximal from September to early October. Other population coefficients were also calculated for Kellicottia longispina and Keratella hiemalis. The macro-benthos was about intermediate in mean dry weight (1.8 gm/sq m) as compared to other oligotrophic lakes and was dominated by Chironomidae. (Little-Battelle)
W74-03277

THE OCCURRENCE OF MICROTURBELLARIA IN SOME BRITISH LAKES OF DIVERSE CHEMICAL CONTENT,
Liverpool Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-03282

A CULTURE SYSTEM FOR ARTEMIA, DAPHNIA, AND OTHER INVERTEBRATES, WITH CONTINUOUS SEPARATION OF THE LARVAE,
Ghent Rijksuniversiteit (Belgium).
P. Sorgeloos, and G. Persoone.
Archiv fur Hydrobiologie, Vol 72, No 1, p 133-138, June 1973. 1 fig, 9 ref.

Descriptors: *Cultures, *Laboratory equipment, *Waterfleas, *Automatic control, *Brine shrimp, Continuous flow, Bioassay, Design, *Daphnia, Invertebrates.
Identifiers: Continuous cultures, Artemia salina, Daphnia magna, Macroinvertebrates.

AN APPARATUS DEVELOPED FOR CONTINUOUS CULTURING OF Artemia, Daphnia, and other invertebrates consists of five chambers, four of which have funnel-shaped bottoms, which are connected by tubes and siphons. Chamber A contains the food supply which can be an algal culture and is connected by siphons to chamber E, the water collector, and chamber B, the adult culturing chamber. Chamber B is connected by a tube from the bottom to chamber C, the larvae collecting chamber, which in turn is connected from the side to chamber D, the water supply. To operate the system, an aquarium pump is switched on by a timer for 5 minutes every half hour to pump water from the water supply (D) to the water collector (E). This activates the siphons connecting the food supply (A) and the culture chamber (B) to bring food and aerated water into chamber B. At the same time the inflow of water carries the larvae from B into the larvae collecting chamber C and the overflow in C goes to the water supply (D). A filter in the culture chamber prevents the transit of adults into the larval chamber. Larvae can be collected by means of a value in the bottom of the collecting chamber. The equipment has been used for 6 months with no special problems. (Little-Battelle)
W74-03283

STUDIES ON PHYTOPLANKTON IN RELATION TO ITS PRODUCTION AND SOME PHYSICAL-CHEMICAL FACTORS IN LAKE SVINSJOEN,
Oslo Univ. (Norway). Dept. of Limnology.
For primary bibliographic entry see Field 05C.
W74-03284

A NEW METHOD FOR THE ESTIMATION OF ABSOLUTE MICROFOSSIL NUMBERS, WITH REFERENCE ESPECIALLY TO DIATOMS,
Uppsala Univ. (Sweden). Dept. of Quaternary Geology.
R. W. Battarbee.
Limnology and Oceanography, Vol 18, No 4, p 647-653, July 1973. 3 fig, 4 tab, 14 ref.

Descriptors: *Diatoms, *Cytological studies, Statistical methods, Sampling, Sediments, Palynology, Lakes, Data processing, Equations.
Identifiers: *Sample preparation, *Counting, Evaporation trays, Method validation, Data interpretation, Lough Neagh, Ireland.

Random distribution of diatoms for estimation of absolute microfossil numbers can be obtained using an evaporation tray with depressions to hold four cover slips. A measured quantity of well mixed suspension is added to the tray and allowed to evaporate without disturbance. The cover slips can then be removed or the samples mounted directly by inverting a slide with mountant on the cover slips. Statistical analyses of randomness and various showed that the technique is statistically reliable. Procedures are given for utilizing these data on combination with data on water content, sediment density, and deposition rate to produce meaningful results. Data obtained for Lough Neagh, Northern Ireland suggest a relationship between increasing total diatom deposition, increasing importance of alkalibiontic species in fossil diatom communities, and the possible progress of eutrophication. (Little-Battelle)
W74-03285

THE CONSTRUCTION OF A SAND PROFILE SAMPLER: ITS USE IN THE STUDY OF THE VORTICELLA POPULATIONS AND THE GENERAL INTERSTITIAL MICROFAUNA OF SLOW SAND FILTERS,
Surrey Univ., Guilford, (England). Dept. of Biological Sciences.
B. Lloyd.
Water Research, Vol 7, No 7, p 963-973, July 1973. 3 fig, 4 tab, 13 ref.

Descriptors: *Connate water, *Aquatic microorganisms, *Fabrication, Protozoa, Rotifers, Annelids, Nematodes, Copepods, Aquatic populations, Methodology, Microscopy, Monitoring, Flow rates, Oligochaetes, Beaches, Filtration, Operation.
Identifiers: Sand profile sampler, *Sampling equipment, Direct sampling, *Sand filters, Flatworms, Species abundance, Vorticella spp, Sampling techniques, Light microscopy, Tardigrades, Gastrotricha, Turbellaria, Suctorians, Marine en-

vironment, Nais, Stylaria fossularis, Aelosoma hemprichii, Vorticella picta, Vorticella campanula, Vorticella convallaria, Vorticella fromenteli, Vorticella communis, Oxytricha, Tachysoma pellionella.

A simple and inexpensive method is described by which the component groups of the interstitial fauna can be examined undisturbed by direct microscopy. The method has been developed specifically to locate and enumerate the functional interstitial microfauna of slow sand filters used in water purification and it is designed to demonstrate the spatial relations of the constituent populations as they develop in time in a flowing system. Details of construction and methods of operating the sampler developed in this study are given. It has the features of (1) simple construction and being composed of cheap materials; (2) no mechanical closure device, thus no jamming; and (3) the depth distribution of living organisms being examined directly and immediately without disturbing the column or subsampling. The sampler has been successfully applied to monitoring the development of Protozoa and Rotifera in pilot scale and full scale slow sand filters at the London Metropolitan Water Board's Walton and Ashford Common Treatment Works. Results are presented for the incidence of the general microfauna and for the development, vertical distribution and effect of flow rate on the Vorticella populations. (Holoman-Battelle)
W74-03286

THE REALITY OF THREE BRITISH BIOTIC INDICES,
Vysoka Skola Chemicko-Technologicka, Prague (Czechoslovakia). Dept. of Water Technology.
V. Sladecek.
Water Research, Vol 7, No 7, p 995-1002, July 1973. 8 tab, 28 ref.

Descriptors: *Natural streams, *Benthic fauna, *Invertebrates, *Bioindicators, Aquatic insects, Water quality, Annelids, Crustaceans, Mollusks, Growth stages, Nematodes, Caddisflies, Midges, Water beetles, Diptera, Oligochaetes, Stoneflies, Mayflies, Snails, Shrimp, Amphipoda, Isopods, Tubificids, Water pollution, Aquatic animals.
Identifiers: *Biotic index, *Saprobic index, Water mites, Species abundance, Macroinvertebrates, Flatworms, Limpets, Water hoglice, Asellus, Alderflies, Chironomids, Leeches, Leuctra, Chironomis thummi, Gammarus, Eristalis tenax, Nais, Planaria alpina, Turbellaria, Ancylus, Rhyacophila, Dicranota, Limnophora, Simulium, Black flies, Baetis, Nemoura, Amphinemura, Hydracarina, Glossiphonia, Haemopis, Tubifex, Chironomus riparius, Capnia, Linmodrilus, Chloroperla, Isoperla, Perla, Taeniopteryx.

In Great Britain three indices are used for classification of streams according to benthic invertebrates: the Trent River Board Biotic Index (Woodiwiss, 1964), the Lothians River Purification Board Index (Graham, 1965) and the Score-System (Chandler, 1970). All these indices are based in reality on the saprobic system of Kolkwitz and Marsson (1902, 1908, 1909) and its modern developments, mainly the saprobic index by Pantle and Buck (1955) and the saprobic valency by Zelinka, Marvan and Kubicek (1959). There is no substantial difference among the procedures named and the results are comparable among themselves as pointed out in this paper. The British indices deal only with a part of the whole extent of water quality and are restricted to running waters. (Holoman-Battelle)
W74-03289

IDENTIFICATION AND INCIDENCE OF KLEBSIELLA IN CHLORINATED WATER SUPPLIES,
Chicago Dept. of Water and Sewers, Ill. Water Purification Div.
D. J. Ptak, W. Ginsburg, and B. F. Willey.
Journal American Water Works Association, Vol 65, No 9, Part 1, p 604-607, September 1973. 1 fig, 5 tab, 14 ref.

Descriptors: *Pathogenic bacteria, *Pollutant identification, Cultures, *Enteric bacteria, *Coliforms, Chlorination, Public health, Water analysis, Biochemistry, Disinfection, Bioindicators, Water supply, Water treatment.
Identifiers: IMViC test, Standard methods, R/B procedure, *Klebsiella, Validation, Fecal coliforms, Survival, Errors.

Concern over the standard method of classifying coliforms, caused the Microbiology Unit, Water Purification Lab., City of Chicago, to institute a study to determine whether a more accurate and rapid classification could be obtained. The 'Modified R/B Enteric Differential System' was selected and used to identify the cause of the occasional positive reactions which occurred during water analysis. The bacterium identified was Klebsiella pneumoniae which is known to be of fecal origin. Since the standard IMViC test would have identified Aerobacter aerogenes, generally considered to be of non-fecal origin, an improved laboratory procedure appears to be needed. The modified R/B procedure used by the Water Purification Laboratory and the resulting reactions are described. Klebsiella has also been found to occur more frequently in treated water supplies than other organisms possible because it is encapsulated in the mucoid phase. Therefore, procedures should be employed to avoid incorrect identification of the organisms. (Little-Battelle)
W74-03294

SEDIMENT COLIFORM POPULATIONS AND POST CHLORINATION BEHAVIOR OF WASTEWATER BACTERIA,
Harris County Pollution Control Dept. Houston, Tex.
S. C. Hulka, S. R. Keen, and E. M. Davis.
Water and Sewage Works, Vol 120, No 10, p 79-81, October 1973. 4 tab, 14 ref.

Descriptors: *Chlorination, *Sediments, Waste water (Pollution), *Enteric bacteria, *Pathogenic bacteria, Bioindicators, Growth rates, *Pollutant identification, Phytoplankton, Disinfection, Pseudomonas, Salmonella, E. coli, Streptococcus, *Coliforms, Waste water treatment.
Identifiers: Aftergrowth, Survival, Fecal coliforms, Fecal streptococci.

Enumeration and identification of bacteria in wastewater collected from the overflow weirs of two secondary clarifiers, showed that significant aftergrowth of bacteria occurred when samples were chlorinated at a level of 1.0 mg/1. Total coliform bacterial counts, fecal coliform bacteria and the types considered 'non-coliform' all demonstrated remarkable regrowth. Fecal streptococci on the other hand, exhibited an appreciably slower die-off rate than in the non-chlorinated sample. The data suggest that chlorination effectively decreased the competitive bacterial populations. Surviving bacteria are listed. Survival of enteric bacteria in effluent from waste stabilization ponds was found to be distinctly related to phytoplankton concentrations. The results of survival tests after chlorination at levels up to 5.0 mg/1 with samples containing more than 20,000 areal standard units of phytoplankton suggest that if disinfection is incomplete, nutrients are present, and bacterial competion is reduced, indicator and pathogenic bacteria may reestablish. Indicator bacteria have also been found in sediments of unpolluted waters, and high levels were found in some cases where sediments were disturbed. It is recommended that rapid and more precise methods of generic identification be developed to eliminate erroneous conclusions which may occur from elevated counts of bacteria resulting from bacterial aftergrowth or natural populations. (Little-Battelle)
W74-03295

EFFECTS OF RESIDUAL CHLORINE ON AQUATIC LIFE,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 05C.
W74-03298

BROWN SEAWEED AS AN INDICATOR OF HEAVY METALS IN ESTUARIES IN SOUTH--WEST ENGLAND,
Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
For primary bibliographic entry see Field 05C.
W74-03301

THE ZOSTERA EPIFAUNAL COMMUNITY IN THE YORK RIVER, VIRGINIA,
Florida Atlantic Univ., Boca Baton. Dept. of Biological Sciences.
G. A. Marsh.
Chesapeake Science, Vol 14, No 2, p 87-97, June 1973. 5 fig, 1 tab, 27 ref.

Descriptors: *Biological communities, *Food webs, *Fish food organisms, Marine plants, Marine animals, Biomass, Dominant organisms, Estuarine environment, Marine microorganisms, Crustaceans, Annelids, Mollusks, Nematodes, Rotifers, Diatoms, Marine fish, Diptera, Invertebrates, Marine algae, Scuba diving, *Virginia, Depth, Water temperature, Gastropods, Amphipoda, Isopods, Shrimp, Biorhythms, Snails, Food habits, Sampling, Clams, Mussels, Speciation, Estuaries.
Identifiers: Epiphytes, *Epifauna, Eelgrass, *York River, *Seasonal variation, Species abundance, Species diversity, Zostera marina, Macroinvertebrates, Flatworms, Acorn worms, Tunicates, Sponges, Bryozoa, Coelenterates, Nemerteans, Nutrient sources.

The invertebrate epifauna occurring on Zostera marina L. in the lower York River, Virginia, was sampled with the aid of SCUBA for 14 consecutive months from a collecting station located at each of three different water depths within a single eelgrass bed. The plants were clipped at their bases and the organisms were washed from the plants into a 0.5-mm sieve, then preserved in 8-10 percent seawater-formalin solution. Each blade was stripped of sediment, epiphytes and sessile fauna. Cleansed plants were oven-dried at 80C for 48 hr, then weighed to the nearest 0.1 g. A total of 112 invertebrate species were collected. The five most abundant non-colonial species (Bittium varium, Paracerceis caudata, Crepidula convexa, Ampithoe longimana and Erichsonella attenuata) accounted for approximately 59 percent of the total fauna. These species dominated the epifauna throughout most of the year. Several other species, including Balanus improvisus, Molgula manhattensis, Polydora ligni and Ercolania fuscata, were abundant for only brief periods. A relatively high average index of affinity (58 percent) between all synchronous sample pairs indicated a generally homogeneous fauna, although several species were differentially distributed with depth. Exfoliation of Zostera after June caused a steady decline in plant biomass, but the abundance of epifauna continued to increase into the summer and fall. Lowest total numbers and species counts occurred in February and early March. Diversity values (H') ranged from 1.92 to 3.90 bits/individual and averaged 3.04 bits/individual for all stations. High species numbers in summer were generally counteracted by relatively low equitabilities (epsilon), with H' showing little seasonal change. The primary sources of nutrition for the epifauna appeared to be (1) plankton and suspended particulate matter, (2) detritus and microorganisms on the plant blades, and (3) epiphytic algae. (Holoman-Battelle)
W74-03302

STANDING CROP OF SALT MARSHES SURROUNDING CHINCOTEAGUE BAY, MARYLAND-VIRGINIA,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 02L.
W74-03304

THE BIOLOGY OF BROWN ALGAE ON THE ATLANTIC COAST OF VIRGINIA. II. PETALONIA FASCIA AND SCYTOSIPHON LOMENTARIA,
Kent State Univ., Ohio. Dept. of Biological Sciences.
R. G. Rhodes, and M. U. Connell.
Chesapeake Science, Vol 14, No 3, p 211-215, September 1973. 14 fig, 20 ref.

Descriptors: *Plant growth, *Phaeophyta, *Plant morphology, Marine algae, Marine plants, Cultures, Germination, Water temperature, Salinity, Benthic flora, Sessile algae, Speciation, Biology, *Virginia.
Identifiers: *Petalonia fascia, *Scytosiphon lomentaria, Plant development, Culturing techniques.

Microscopic, brown algal crusts and filaments were collected in the summer from an oyster reef on the Atlantic coast of Virginia and isolated into culture. Developmental studies showed that the isolates were microscopic stages of Petalonia and Scytosiphon. These two brown algae exist the year around in the form of either microscopic or macroscopic plants. In culture no sexual reproduction was found linking the two stages of either Petalonia or Scytosiphon. The zoospores from the macroscopic plants of Petalonia and Scytosiphon developed directly into crusts and initials on the crusts developed directly into macroscopic plants. Culture conditions of 10C and a 9-15 hour photoperiod stimulated the development of macrothalli in both taxa. (Holoman-Battelle)
W74-03309

DETERMINATION OF FATTY ACID COMPOSITION BY GAS CHROMATOGRAPHY: I. ANALYSIS WITH USE OF THERMAL CONDUCTIVITY DETECTOR,
Japan Oil Chemist Society, Tokyo. Gas Chromatography Committee.
For primary bibliographic entry see Field 02K.
W74-03311

DETERMINATION OF FATTY ACID COMPOSITION BY GAS CHROMATOGRAPHY: II. ANALYSIS WITH USE OF FLAME IONIZATION DETECTOR,
Japan Oil Chemist Society, Tokyo. Gas Chromatography Committee.
For primary bibliographic entry see Field 02K.
W74-03312

A NEW MULTIPARAMETER SEPARATOR FOR MICROSCOPIC PARTICLES AND BIOLOGICAL CELLS,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 07B.
W74-03313

A CONTRIBUTION TO THE ECOLOGY AND DISTRIBUTION OF AQUATIC ACARI IN THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 05C.
W74-03314

PREPARATION OF SLIDE PERIPHYTON FOR VARIOUS PRODUCTIVITY ANALYSES,
Bemidji State Coll., Minn. Dept. of Biology.
For primary bibliographic entry see Field 07B.
W74-03315

STERILE CULTURE TECHNIQUES FOR SPECIES OF THE ROTIFER ASPLANCHNA,
California Univ., Riverside. Dept. of Biology.
R. C. Aloia, and R. L. Moretti.
Transactions of the American Microscopical Society, Vol 92, No 3, p 364-371, July 1973. 2 fig, 10 ref.

Descriptors: *Bacteria, *Rotifers, *Protozoa, Methodology, Life cycles, Growth rates, Harvesting, Microorganisms, Invertebrates, Cultures, Population, Temperature, Centrifugation.
Identifiers: *Culturing techniques, Sterile cultures, Culture media, *Growth media, Sample preparation, Asplanchna brightwelli, Paramecium aurelia, Aerobacter aerogenes, Asplanchna sieboldi, Clones.

Several new techniques are subscribed for culturing the rotifer Asplanchna brightwelli, the protozoan, Paramecium aurelia, and the bacterium Aerobacter aerogenes. The bacterium is grown at 37C, harvested by centrifugation, and stored in a separatory funnel in a concentrated suspension at 4C. Aliquots of the bacterial medium are fed to cultures of paramecia which are maintained at 31C. Portions of the paramecia solutions, in turn, are fed to rotifer populations at room temperature. The entire culture scheme is sustained by employing aseptic procedures. Sterile culture conditions were maintained by working under aseptic hoods containing UV germicidal lamps turned on at all times. The glassware was vigorously washed in Tide, thoroughly rinsed in tap and distilled water, drained dry, wrapped in tin foil, and autoclaved at 15 psi for 20 min. Glassware used for chemicals was washed separately from that used for bacteria, paramecia, and rotifers. (Holoman-Battelle)
W74-03316

BIOTIC CHARACTER AS RELATED TO STREAM MINERAL CONTENT,
North Dakota Univ., Grand Forks. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W74-03317

AN AEROPHILOUS DIATOM COMMUNITY FROM HOCKING COUNTY, OHIO,
Bowling Green State Univ., Ohio. Dept. of Biology.
R. L. Lowe, and G. B. Collins.
Transactions of the American Microscopical Society, Vol 92, No 3, p 492-496, July 1973. 5 fig, 1 tab, 5 ref.

Descriptors: *Diatoms, Biological communities, *Cytological studies, *Ohio, Aquatic habitats, *Ecological distribution, *Aerobic conditions, Dominant organisms, Winter, *Electron microscopy, Aquatic algae, Chrysophyta, Systematics.
Identifiers: Scanning electron microscopy, Sample preparation, Species abundance, Cell morphology, Achnanthes coarctata, Achnanthes lanceolata, Achnanthes lanceolata var. dubia, Amphora ovalis var. lybica, Amphora ovalis var. pediculus, Caloneis aerophila, Caloneis bacillum, Cocconeis placentula, Cocconeis placentula var. euglypta, Cymbella prostrata, Cymbella sineuata, Cymbella tumida, Frustulia vulgaris, Gomphonema acuminatum, Gomphonema angustatum var. sarcophagus, Gomphonema parvulum, Hantzschia amphioxys.

An aerophilous winter diatom community consisting of 41 taxa was dominated by Melosira roseana Rabh., both in terms of number of cells and biomass. Scanning electron microscopy revealed details of M. roseana auxospore and vegetative cells not previously reported. (Holoman-Battelle)
W74-03318

STREPTOCEPHALUS MOOREI N. SP., A NEW FAIRY SHRIMP (ANOSTRACA) FROM MEXICO,
Arizona State Univ., Tempe. Dept. of Zoology.
For primary bibliographic entry see Field 02I.
W74-03319

OBSERVATIONS ON RED COLORED CELLS OF PERIDINIUM WISCONSINENSE EDDY FROM BUCKHORN LAKE, ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W74-03320

STATISTICAL PREDICTION OF EQUILIBRIUM TEMPERATURE FROM STANDARD METEOROLOGICAL DATA BASES,
ESL, Inc., Sunnyvale, Calif.
C. M. Hogan, L. C. Patmore, and H. Seidman.
Copy available from GPO Sup Doc as EP1.23:660-73-003, $2.55; microfiche from NTIS as PB-226 874, $1.45. Environmental Protection Agency, Technology Series, Report EPA-660/2-73-003, August 1973. 271 p, 63 fig, 16 tab, 5 ref. EPA Project 16130 GSD. 68-01-0167.

Descriptors: *Water temperature, *Stochastic processes, Statistical models, Mathematical models, *Energy budget, Heat budget, Meteorology, Computer programs, *Forecasting, *Meteorological data, Air-water interfaces, Distribution patterns.
Identifiers: *Equilibrium water temperature, Water temperature prediction.

A computer program has been written and applied to investigate the stochastic distribution of equilibrium temperature as determined from a standard meteorological data base. The equilibrium temperature at an air-water interface is the temperature which would be attained by the surface if the net heat flow through it were zero. Since it is a basic factor in the prediction of actual water temperatures, the distribution of equilibrium temperature, and hence of water temperature, is an important statistic. In the process, data from three cities (Fresno, California; Boston, Massachusetts; and Portland, Oregon) and for several time periods were compared through use of U.S. Weather Bureau hourly observations of surface and solar weather data, collected over 10 years. The conclusions arrived at concern both the use of the data and the computation of the distribution of equilibrium temperature. (EPA)
W74-03330

GEOCHEMICAL HYDROLOGY OF THE BATON ROUGE AQUIFERS,
Louisiana State Univ., Baton Rouge. School of Geoscience.
For primary bibliographic entry see Field 04B.
W74-03335

TRACE-ELEMENT DISTRIBUTION IN THE CONTINENTAL-SHELF SEDIMENTS OFF THE EAST COAST OF INDIA,
Andhra Univ., Waltair (India). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-03350

AN EVALUATION OF WATER-QUALITY DATA OBTAINED AT FOUR STREAMFLOW DAILY-RECORD STATIONS IN IDAHO,
Geological Survey, Boise, Idaho.
K. L. Dyer.
Available from NTIS, Springfield, Va. 22151 PB-224 066 Price $5.00 printed copy; $1.45 microfiche. Water-Resources Investigations 30-73, August 1973. 51 p, 4 fig, 1 tab, 5 ref, 4 append.

Descriptors: *Water quality, *Surface waters, *Idaho, *Streamflow, Correlation analysis, Flow

rates, Streams, Chemical analysis, Water analysis, Regression analysis, Hydrologic data, Reviews, Evaluation.

Four streamflow water quality stations in Idaho with historical records ranging from 7 to 22 years were analyzed statistically to show the functional relationships of the major inorganic chemical constituents to specific conductance and stream discharge. The data for each of the three long-term stations were subdivided into approximately five-year segments; then plots and regression equations were derived for each record segment in order to assess changes in constituent relations with time. In general, highly significant correlations were observed between the major inorganic ions and specific conductance. Correlations were usually observed between these same ions and discharge. The only significant change in chemical characteristics with time occurred at the Boise River at Notus, where the percentages of chlorides and sulfates in solution declined appreciably between 1940 and 1951 while bicarbonate percentages increased. At two stations the common ion-discharge relations were more highly correlated before 1957 than thereafter, presumably because of construction of upstream dams and changes in water regulation. (Woodard-USGS)
W74-03507

IS PHOSPHATE REDUCED TO PHOSPHINE IN WATERLOGGED SOILS,
Reading Univ. (England). Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-03523

MICROELEMENT CONTENT AND REGIME IN WATER AND SUSPENDED SOLIDS IN THE VOLGA RIVER BASIN (SODERZHANIYE I REZHIM MIKROELEMENTOV V VODE I VO VZVESHENNYKH VESHCHESTVAKH V BASSEYNE R. VOLGI),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
For primary bibliographic entry see Field 02K.
W74-03533

RECENT STUDIES OF MERCURY ANALYSIS PROCEDURES FOR MILL EFFLUENTS,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
W. L. Carpenter.
NCASI Stream Improvement Technical Bulletin, No. 263, December 1972. 49 p, 6 fig, 8 tab, 3 appends, 36 ref.

Descriptors: *Mercury, Water analysis, *Analytical techniques, *Spectrophotometry, *Pollutant identification, *Monitoring, Effluents, Industrial wastes, Pulp and paper industry, *Pulp wastes, Calibrations, Instrumentation, Trace elements, Chemical analysis, Fish, Organic compounds, Inorganic compounds, Oxidation.
Identifiers: Flameless atomic absorption spectroscopy, Atomic absorption spectroscopy, Persulfate oxidation, Persulfates.

A review is presented key instrumental and special chemical aspects of flameless atomic absorption analysis and the superiority of persulfate oxidation in the presence of acids for converting organic mercury (Hg) to its inorganic form. It also provides information on the preparation of instrument calibration curves and identifies possible sources of analytical errors and means for avoiding them. It concludes that although Hg can be detected in water samples at levels as low as 0.35 ppb (parts per billion), the practical limit of detection in mill effluent samples is 1 ppb, using a reasonable number of replicate analytical determinations. Flameless atomic absorption analysis provides a reliable technique for routine monitoring of pulp and paper mill effluents to detect Hg. Two appendices describe the EPA procedure (January 1972) and the TVA procedure for Hg analyses; a third appendix compares Hg concentrations in fish tissue as measured in several laboratories by different procedures. (Witt-IPC)
W74-03542

AN INVESTIGATION OF ATOMIC ABSORPTION ANALYSIS OF MILL EFFLUENT METAL ION CONTENT,
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.
R. P. Fisher.
NCASI Stream Improvement Technical Bulletin, No. 262, December 1972. 58 p, 12 fig, 12 tab, 6 append, 25 ref.

Descriptors: Water analysis, *Analytical techniques, *Cations, *Metals, *Spectroscopy, *Pollutant identification, Waste water (Pollution), Zinc, Lead, Copper, Chromium, Cadmium, Nickel, Manganese, Magnesium, Calcium, Effluents, *Pulp wastes, Pulp and paper industry, Standards, Specifications.
Identifiers: Atomic absorption spectroscopy.

The analytic capabilities of techniques described in 'Standard Methods for Examination of Water and Wastewater' for detecting the presence of Zn, Cu, Cd, Pb, Ni, Mn, Mg, and Ca in pulp and paper mill effluents were investigated. The atomic absorption technique was selected as the best presently available standard method. It was used to determine the metal cation contents of 23 mill effluent samples. Limits of detection for each cation were established, along with relative standard deviations. The fundamental principles and features of atomic absorption analysis are described. Problems that may be encountered in determining each of the nine metal cations are indicated. Guidelines are given for requesting heavy metal analyses from service laboratories and for evaluating the reported data. (Witt-IPC)
W74-03543

GAS CHROMATOGRAPHIC DETERMINATION OF METHYL MERCURY IN FISH, SEDIMENT, AND WATER,
National Environmental Research Center, Cincinnati, Ohio.
J. E. Longbottom, R. C. Dressman, and J. J. Lichtenberg.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1297-1303, November 1973. 2 fig, 1 tab, 12 ref.

Descriptors: *Water analysis, *Mercury, *Pollutant identification, Fish, Sediments, *Analytical techniques, *Gas chromatography, Chromatography, Chemical analysis, Organic compounds, Inorganic compounds, Correlation analysis.
Identifiers: Mercury compounds, *Methyl mercury.

Methyl mercury is extracted as the bromide salt from fish and sediment, and as the chloride salt from water samples. All extracts are purified by a procedure using sodium thiosulfate and potassium iodide to convert methyl mercury to the iodide salt for analysis by electron capture gas chromatography. Average recoveries ranged from 88.5% for water samples to 95.5% for perch and 96.3% for sediment samples. Column and detector poisoning were two particular problems encountered. Procedures for controlling contaminants and interferences are indicated. When the method was applied to sediment samples from a polluted river, a correlation was found between methyl mercury and total mercury concentrations when the latter ranged between zero and 10 microgram. The correlation failed for samples of high inorganic Hg content. (Brown-IPC)
W74-03549

ANALYSIS OF TRACE ORGANIC COMPOUNDS IN NEW ENGLAND RIVERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
R. A. Hites.
Journal of Chromatographic Science, Vol 11, No 11, p 570-574, November 1973. 4 fig, 2 tab, 13 ref.

Descriptors: *Water analysis, *Water pollution sources, *Pollutant identification, *Organic compounds, *Massachusetts, New England, *Industrial wastes, *Chemical wastes, Textiles, Plastics, Analytical techniques, Chemical analysis, Waste water (Pollution), Chemical industry, Dye releases, Additives.
Identifiers: Plasticizers, Merrimack River (Mass), Monatiquot River (Mass).

Waters from the Monatiquot and Merrimack Rivers (Massachusetts) were examined for presence of anomalous lipophilic organic compounds, using computer-aided gas-chromatography/mass spectrometry and high-resolution mass spectrometry. Several plasticizers of the dialkyl phthalate and adipate type were found in the Monatiquot River in 1-300 ppb amounts, probably originating from discharges of a plastics factory. The Merrimack River samples contained 0.1-0.5 ppb traces of biphenyl, trichlorobenzene, and butyl benzoate, all commonly used as dye bath additives and hence attributable to textile factories, notably effluents of the New England synthetic fiber industry. (Brown-IPC)
W74-03553

REVIEW OF RAPID BOD TEST METHODS,
Beak (T. W.) Consultants Ltd., Montreal (Quebec).
P. J. LeBlanc.
Canadian Department of the Environment, Pulp and paper Pollution Abatement, Project Report 138-1, July 31, 1972. 24 p, 1 tab, 33 ref.

Descriptors: *Biochemical oxygen demand, *Analytical techniques, *Water analysis, *Pulp wastes, Pulp and paper industry, Volumetirc analysis, Measurement, Testing procedures, Water quality control, *Reviews, Methodology.
Identifiers: Short-term BOD tests.

A literature review of short-term BOD test methods resulted in the evaluation of several techniques used to predict or simulate the conventional five-day BOD standard dilution method. The most promising substitute methods applicable to the needs of the pulp and paper industry include determination of one-day BOD at 37C, acidimetric titration, and measurement of total BOD. (Brown-IPC)
W74-03557

THE CHIRONOMIDS OF THE PERIPHYTON IN THE YUGOSLAV PART OF THE RIVER DANUBE (DIE CHIRONOMIDENFAUNA AUS DEM PERIPHYTON IN DER JUGOSLAWISCHEN DONAUSTRECKE),
Institute for Biological Research, Belgrade (Yugoslavia).
M. Jankovic.
Archiv fur Hydrobiologie, Vol 44, No 2, p 249-257, March 1973. 5 tab, 6 ref. (English summary).

Descriptors: *Aquatic insects, *Water pollution effects, *Periphyton, Midges, Dominant organisms, Speciation, Systematics, Biological communities, Secondary productivity, Ecological distribution, Diptera, Aquatic animals, Waste water (Pollution), Industrial wastes, Municipal wastes, Larvae, Invertebrates.
Identifiers: *Danube River, *Chironomids, Species abundance, *Yugoslavia, Ablabesmya gr. lentiginosa, Diamesa insignipes, Brillia longifurca, Cricotopus algarum, Cricotopus bicinctus, Cricotopus biformis, Cricotopus latidentatus, Criotopus silvestris, Cricotopus trifascia, Eukief-

feriella bavarica, Limnophyes septentrionalis, Microcricotopus bicolor, Euorthocladius rivicola, Rheorthocladius rhyacobius, Rheorthocladius rubicundus, Rheorthocladius saxicola, Polypedilum gr. convictum, Polypedilum gr. laetum.

A preliminary account is given of the fauna of a stretch of the Yugoslav part of the Danube, 50 km long. The results were obtained at the beginning of April 1971. Twenty-one species of chironomid were recorded in the Danube between Belgrade and Smederevo, 70 percent of them for the first time. Eighty-one percent of the species were of the subfamily Orthocladiinae. Cricotopus algarum, the commonest and most abundant species was the only one which occurred in all the localities. Less frequent but almost as abundant was Rheorthocladium rubicundus. Rh. rhyacobius was also important despite its relatively low abundance. The subfamily Chironominae was represented only by 3 species, two of them playing periodically a more or less important role in the periphyton fauna. More frequent was Polypedilum gr. convictum, which exhibited considerable production in the polluted part of the Danube where another species of the genus, P. gr. laetum, was the predominant species. The municipal and industrial wastewaters reduce the number of chironomid species and cause changes of their composition. Thus species of Chironominae were predominant in places affected by the iron smelter, whereas Orthocladiinae predominated in the part polluted by municipal wastewaters as well as in the clean sector of the Danube. (Holoman-Battelle)
W74-03562

FISHES AS INDICATORS OF WATER QUALITY AND THEIR SIGNIFICANCE FOR ECONOMIC USE (FISCHE ALS INDIKATOR DER GEWASSERGUTE UND IHRE BEDEUTUNG FUR DIE WASSERWIRTSCHAFTLICHE NUTZUNG),
Institute for Biological Research, Belgrade (Yugoslavia).
D. Jankovic.
Archiv fur Hydrobiologie, Vol 44, No 2, p 222-228, March 1973. 23 ref. (English summary).

Descriptors: *Bioindicators, *Water quality, *Industrial wastes, *Sewage effluents, *Mine wastes, *Farm wastes, Freshwater fish, Water pollution effects, Toxicity, Resistance.
Identifiers: *Danube River, Alburnus alburnus, Chondrostoma nasus, Scardinius erythrophthalmus, Blica bjoerkna, Cyprinus carpio, Acipenser ruthenus, Stizostedion lucioperca.

Fishes react differently to the intensity and nature of pollution, which makes them useful as indicators of water quality. Alburnus alburnus L., Chondrostoma nasus L., Scardinius erythrophthalmus L., Blica bjoerkna L., and others are rather tolerant of wastewaters of industry, mining and sewage from villages and agriculture. The decrease of economically valuable fish species, Cyprinus carpio carpio L., Acipenser ruthenus L., Stizostedion lucioperca L., and others, in the Danube and its tributaries depends on various factors, one of them being the pollution caused by untreated effluents. The knowledge of these adverse effects on the fauna of the Danube system makes possible an actual project for the development of fisheries. (Little-Battelle)
W74-03563

TITRIMETRIC DETERMINATION OF URANIUM WITH ELECTROGENERATED VANADIUM (V),
New Brunswick Lab. (AEC), N.J.
For primary bibliographic entry see Field 02K.
W74-03564

IODIDE OXIDATION BY A MARINE BACTERIUM,
Technion - Israel Inst. of Tech., Haifa. Dept. of Food Engineering.
R. S. Gozlan, and P. Margalith.
Journal of Applied Bacteriology, Vol 36, No 3, p 407-417, September 1973. 8 fig, 5 tab, 28 ref.

Descriptors: *Iodine, *Sea water, *Oxidation, Resistance, Systematics, Electron microscopy.
Identifiers: *Pseudomonas iodooxidans, *Cell morphology, *Iodine cycle, Mobilization, Sample preparation, Culture media.

Death of euryhaline fish in an aquarium was caused by iodine liberated in seawater by a marine bacterium. The isolation of a pure culture of Pseudomonas iodooxidans sp. nov., highly resistant to iodine, led to the elucidation of the mechanism involved. Iodides were oxidized to free iodine by an extracellular peroxidase system and hydrogen peroxide was generated by the bacteria. The importance of this finding is discussed in the light of current knowledge of the iodine cycle in nature. (Little-Battelle)
W74-03565

DISSOCIATION IN A MARINE PSEUDOMONAD,
Macdonald Coll., Ste. Anne de Bellevue (Quebec). Dept. of Microbiology.
J. A. Gow, I. W. DeVoe, and R. A. MacLeod.
Canadian Journal of Microbiology, Vol 19, No 6, p 695-701, June 1973. 3 fig, 3 tab, 21 ref.

Descriptors: *Marine bacteria, Isolation, Radioactivity techniques, Growth rates, Sodium, Salt tolerance, Assay, Methodology, Essential nutrients, Deficient elements, Absorption.
Identifiers: *Pseudomonads, *Bacterial physiology, Characterization, *Dissociation, Bioaccumulation, Alpha-Aminoisobutyric acid, Culture media, Protoplasts, Cell morphology, Nutrient media.

Eight morphological variants, the product of colonial dissociation, were isolated from cultures of the marine pseudomonad B-16. Features which distinguished the variants were smooth versus rough colony type, the presence or absence of color, and differences in colony diameter. The variants differed in their capacity to form stable protoplasts and to grow at suboptimal Na (plus) concentrations in defined medium. All, however, required Na (plus) for growth. The ability of the organism to accumulate alpha-aminoisobutyric acid (AIB) and the requirement for Na (plus) for this process was not affected by dissociation. (Holoman-Battelle)
W74-03566

AQUATIC SEDIMENT AS A HABITAT OF EMERICELLOPSIS, WITH A DESCRIPTION OF AN UNDESCRIBED SPECIES OF CEPHALOSPORIUM,
Institute for Fermentation, Osaka (Japan).
K. Tubaki.
Mycologia, Vol 65, No 4, p 938-941, July/August 1973. 4 fig, 1 tab, 13 ref.

Descriptors: *Marine fungi, *Muds, *Sea water, *Brackish water, Systematics, Salinity, Habitats.
Identifiers: *Emericellopsis humicola, Emericellopsis minima, Emericellopsis microspora, Cephalosporium polyaleurium, *Japan, Culture media.

During a survey of the marine, brackish-, and fresh-water fungi of Japan, three species of Emericellopsis were isolated from the muds of four sites: 26 strains of E. humicola, 3 strains of E. minima, and 6 strains of E. microspora. All three species belong to the small-spored section of the genus. Cephalosporium was also found to be common in muds either as conidial states of Emericellopsis or as imperfect states only. A new species, C. polyaleurum, is described which is common in coastal muds and is characteristic both in the smaller amount of conidial production and in the formation of numerous aleuriospores. This fungus grew better on 30-100 percent seawater medium (with 1 percent glucose and 0.1 percent yeast extract) than on freshwater medium. (Little-Battelle)
W74-03568

DIRECT FLUORESCENT-ANTIBODY TECHNIQUE FOR THE MICROBIOLOGICAL EXAMINATION OF FOOD AND ENVIRONMENTAL SWAB SAMPLES FOR SALMONELLAE,
General Foods Corp., Battle Creek, Mich. Post Div. Research.
N. F. Insalata, C. W. Mahnke, and W. G. Dunlap.
Applied Microbiology, Vol 26, No 3, p 268-270, September 1973. 1 tab, 12 ref.

Descriptors: *Salmonella, Cultures, *Pollutant identification, Foods.
Identifiers: *AOAC Methods, *Fluorescent antibody techniques, Method evaluation, Swab samples.

Comparative studies of a modified fluorescent-antibody (FA) procedure and the 5 to 7 day method used by the Association of Official Analytical Chemists for the detection of Salmonella were made on 151 samples of wheat products and 183 swab samples from in-process equipment. The agreement between the two methods for the 334 samples tested was 92.5 percent. Food samples yielded 94.7 percent agreement, whereas the swab samples yielded 90.7 percent agreement. There were 7.5 false positives for the total number of samples tested. No false negatives were obtained by using the fluorescent-antibody method. The study also demonstrated that pooling suspect samples is possible to permit larger numbers to be tested simultaneously by FA. (Little-Battelle)
W74-03569

QUANTITATIVE EXTRACTION OF ADENOSINE TRIPHOSPHATE FROM CULTIVABLE AND HOST-GROWN MICROBES: CALCULATION OF ADENOSINE TRIPHOSPHATE POOLS,
Johns Hopkins Univ., Baltimore, Md. Dept. of Pathobiology.
A. M. Dhople, and J. H. Hanks.
Applied Microbiology, Vol 26, No 3, p 399-403, September 1973. 3 tab, 7 ref.

Descriptors: *Separation techniques, *E. coli, Enteric bacteria, Bioluminescence.
Identifiers: *Adenosine triphosphate, *Mycobacterium phlei, *Mycobacterium lepraemurium, Sample preparation.

Existing data on adenosine triphosphate (ATP) pools in microbes are deficient for two reasons: (1) incomplete extractions of ATP, and (2) the failure to take into account that the adverse effects of extracting procedures on standard ATP exert analogous effects on the ATP released from bacterial cells. Methods for correcting observed yields and calculating ATP pools have been demonstrated. Three bacterial species were used in the studies on extraction of ATP: Escherichia coli, Mycobacterium phlei, and Mycobacterium lepraemurium. Perchloric acid and n-butanol were disqualified because of inconvenient procedures. The new extraction procedure had minimal effects on standard ATP, liberated 100 percent of the ATP pools from the three representative species of microbes, and caused no ionic imbalance or quenching of bioluminescence. This method involves vortexing of cell suspensions for 10 s with 23 percent chloroform (vol/vol), heating at 98 C for the required time (E. coli, 3 min; M. phlei, 5 min; M. lepraemurium, 10 min) and then 1 min at 98 C with vacuum to dry the samples. Heat or chloroform alone may suffice for some microbes

and release total ATP from plant and animal cells. (Little-Battelle)
W74-03570

A SENSITIVE BIO-BEHAVIORAL ASSAY FOR METHYL MERCURY,
Waterloo Univ. (Ontario). Dept. of Psychology.
R. Lahue.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 3, p 166-169, September 1973. 1 fig, 1 tab, 4 ref.

Descriptors: *Bioassay, *Animal behavior, Mercury, Heavy metals, Water pollution effects, Toxicity, Monitoring, Bioindicators.
Identifiers: *Methylmercury, *Spider webs, Araneus diadematus.

Since slight changes in physiology or metabolism of the spider result in alteration of web structure, tests were conducted to investigate whether methylmercury could be detected in this way. Spiders (Araneus diadematus) were allowed to construct webs in specially designed cages. After photographing the webs daily for a suitable period of time, spiders were fed small amounts of methyl mercuric chloride in a drop of sugared water along with a fruit fly. Four groups of spiders were fed doses of 1, 2, 5, 50 micro micrograms/day. Two general effects of exposure were observed: web structure and frequency of web building were altered. At low doses (1 and 2 micro micrograms/day) web building was facilitated during two weeks of exposure. At these dosages, detail and size of webs also increased in more than half the webs for two weeks after which small and distorted webs predominated. At the higher doses (5 and 50 micro micrograms/day) frequency of web construction decreased to the point of complete elimination. The webs that were built were generally much smaller and less detailed than normal. This bioassay procedure is extremely sensitive and should be valuable for monitoring suspected environmental sources of contamination. (Little-Battelle)
W74-03572

PRODUCTION OF BACTERIOPHAGE BY LYOPHILIZED AND OXYGEN-EXPOSED ESCHERICHIA COLI,
Israel Inst. for Biological Research, Nes Ziyyona.
E. Israeli, and A. Shapira.
Journal of General Microbiology, Vol 79, No 1, p 159-161, November 1973. 1 tab, 10 ref.

Descriptors: *E. coli, *Oxygen, *Bacteriophage, *Freeze drying, Bioindicators, Proteins, Analytical techniques, Synthesis, Cultures.
Identifiers: *Lyophilized bacteria, DNA, FDO bacteria, RNA, Survival.

An investigation was conducted to determine whether protein and DNA synthetic mechanisms could function correctly under some other control than that of the cell. E. coli strains were used to investigate the ability of freeze-dried, oxygen-exposed (FDO) bacteria to produce phage. There was no difference in the burst size in phage-infected bacteria between FDO and control organisms. These results suggested that the mechanism of DNA and protein synthesis in FDO bacteria remained intact after oxygen exposure, and was able to function only under a different control. Although the present results do not show any difference in response to phage infection between lyophilized and FDO bacteria, the phage production capacity of lyophilized bacteria before or after exposure to oxygen was only 10 percent of non-lyophilized controls. The percentage of bacteria producing phage was related to the percentage of microscopically observed filamentous forms in the population of such pre-incubated, lyophilized as well as FDO bacteria. It seems that the main cause of death of bacteria upon freeze-drying and exposure to 02 is not damage to DNA, RNA or protein synthesis mechanisms per se, but rather interference with a control mechanism, probably linked with the initiation of the new reproductive cycle. (Mortland-Battelle)
W74-03575

DETERMINATION OF TRACE ORGANICS IN AIR AND WATER,
Monsanto Co., St. Louis, Mo.
J. P. Mieure, and M. W. Dietrich.
Journal of Chromatographic Science, Vol 11, No 11, p 559-570, November 1973. 15 fig, 8 tab, 12 ref.

Descriptors: *Potable water, *Waste water (Pollution), *Organic compounds, *Gas chromatography, *Separation techniques, Rivers, Organic wastes, *Pollutant identification, Solvents, Phenols, Alcohols, Nitrogen compounds, Aromatic compounds, Ethers, Industrial wastes, Sulfides, Pesticides, Water pollution, Air pollution.
Identifiers: Methylene chloride, Carboxylic acids, Amides, Esters, Aliphatic amines, Anilides, Sample preparation, Butyl benzyl phthalate, Butyl diphenyl phosphate, Heterocyclics, Aldehydes, Ketones, Methanol, Acetone, Benzene, Chloroform, Aniline, Methyl isobutyl ketone, m-Cresol, o-Ethylphenol, p-Ethylphenyl, Chromatograms, Cresols.

Several procedures have been developed for measuring trace organics in air and water matrices. These methods use only the equipment and apparatus normally found in an analytical laboratory, and require a minimum of operator training. The scheme used for analyzing both air and water consists of the following operations: (1) The organics are concentrated and isolated from the matrix. (2) The components of interest are identified. (3) The identified compounds are measured. The second two operations are based primarily on gas chromatography (GC) and utilize relatively standard techniques. These are basically the same for air or water. Three specific procedures for determining trace organics in water, particularly waste water are described. The identification and quantitation steps are basically the same for the three procedures and use standard GC techniques. The procedures differ in their method of sample concentration. One is based on liquid-liquid extraction, another on head space sampling and the third on concentration with a packed column. Analysis of tap water, waste water, and river water revealed the presence of a number of organic compounds. (Mortland-Battelle)
W74-03576

COMPLEXING CAPACITY OF NATURAL WATER - ITS SIGNIFICANCE AND MEASUREMENT,
Dept. of Environment, Burlington (Ontario). Centre for Inland Waters.
Y. K. Chau.
Journal of Chromatographic Science, Vol 11, No 11, p 579, November 1973. 1 tab, 10 ref.

Descriptors: *Trace elements, *Copper, *Ions, Chelation, Photosynthesis, Absorption, Lake Ontario, Lake Erie, Water pollution effects.
Identifiers: *Complexing capacity, *Anodic stripping voltammetry, Ligands, Chelating agents.

The abundance of complexing ligands in a body of water determined the complexing capacity of the water and hence its regulating capability. The measurement of complexing capacity of a water sample is based on the amount of copper ion being complexed by the organic ligands through direct complexation and/or displacement reaction. It is done by spiking several aliquots of a sample with increasing amounts of a copper solution. Then the uncomplexed copper is measured by a differential pulse anodic stripping voltammetric technique. After the complexing ligands in the sample have been saturated with copper, the peak current of free copper will increase linearly with the amount of the copper spikes. By extrapolating this linear curve back to zero peak current, the intercept of the X-axis represents the complexing capacity of the water expressed as equivalents of micro mole Cu/l. As the differential pulse anodic stripping voltammetry measurement of 'free' copper is carried out in a system containing excess of copper ions, the peak current thus obtained represents the concentration of 'free' copper. The amount of copper plated out from the labile complexes, if any, becomes insignificant. The significance of complexing capacity of water on the effect and toxicity of copper ion on algal photosynthesis has also been investigated elsewhere using the C-14 uptake technique with lake waters of different complexing capacity and with the original plankton species. (Mortland-Battelle)
W74-03578

A METHOD FOR THE HIGH TEMPERATURE GAS CHROMATOGRAPHIC ANALYSES OF PETROLEUM RESIDUES,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
E. M. Levy, L. R. Webber, and J. D. Moffatt.
Journal of Chromatographic Science, Vol 11, No 11, p 591-593, November 1973. 3 fig, 5 ref.

Descriptors: *Oil wastes, *Gas chromatography, *Separation techniques, Oil pollution, Oil spills, *Pollutant identification.
Identifiers: Crude oil, Oil residues, Fuel oil, *Hydrocarbons.

An analytical procedure is described by which crude oils, residual fuel oils and pollution samples can be analyzed by high temperature gas chromatography without pretreatment of the sample. Problems, which would otherwise arise from contamination of the system by the high boiling residues in the oils, are avoided by placing the sample in an aluminum boat in which the involatile residues are retained. The technique is as follows: with the carrier gas flowing through the system, the detector at the operating temperature (400 C), and both the column and injection port at room temperature, the septum nut and aluminum disc are removed from the instrument and the boat containing the weighed sample is placed into the injection port. The injection port is reclosed and its temperature increased to a few (about 10 C) degrees below 400 C. Substances with an appreciable vapor pressure at this temperature are swept onto the comparatively cold column where presumably they condense. After the injection port has been maintained at this temperature for approximately five minutes, the sample boat containing the involatile residue is removed from the injection port. The temperature of the column is then increased at 6 C/min to 400 C. This temperature program proved to be appropriate for the analysis of the higher boiling constituents in a wide variety of crude oil, residual fuel oils, and pollution samples. (Mortland-Battelle)
W74-03579

A MULTIPLE SPECIFIC ION DETECTOR AND ANALOG DATA PROCESSOR FOR A GAS CHROMATOGRAPH QUADRUPOLE MASS SPECTROMETER SYSTEM,
California Univ., Los Angeles. Dept. of Pharmacology.
For primary bibliographic entry see Field 02K.
W74-03580

PHOTOCHEMISTRY OF BIOACTIVE COMPOUNDS. KINETICS OF SELECTED S--TRIAZINES IN SOLUTION,
Michigan State Univ., East Lansing. Dept. of Chemistry, Michigan State Univ., East Lansing. Dept. of Entomology.
L. O. Ruzo, M. J. Zabik, and R. D. Schuetz.
Journal of Agricultural and Food Chemistry, Vol 21, No 6, p 1047-1049, November/December 1973. 4 fig, 2 tab, 10 ref.

Descriptors: *Triazine pesticides, *Pesticide kinetics, *Pollutant identification, Aqueous solutions, Chromatography, Light, Irradiation, *Organic compounds.
Identifiers: Photochemistry, Methanol, n-Butyl alcohol, Photolysis, Thin layer chromatography, Fate of pollutants, Photodecomposition.

The purpose was to extend the knowledge of the photochemistry of symmetrical substituted triazines. The rate variations caused by solvent and substituent effects indicate certain characteristics of the excited state which will be useful in the understanding of their photoreactions. The rate constants (k) for several 2-methylthio and 2-halo-4, 6-bias (alkylamino)-s-triazines were calculated in methanol, n-bytyl alcohol, and water solutions. The rate of disappearance of the starting material (I-XII) was found to be dependent on the nature of the halogen and alkyl substituents and the solvent employed. A decrease in k was observed in the order I-Br-Cl-F and -C2H5 greater than -C3H7. All photoreactions showed zero-order rate constants. The rate constant in methanol was found to be considerably greater than that calculated in n-butyl alcohol. (Mortland-Battelle)
W74-03582

PHOTODECOMPOSITION OF P--CHLOROPHENOXYACETIC ACID,
California Univ., Davis. Dept. of Environmental Toxicology.
For primary bibliographic entry see Field 05B.
W74-03583

PHOTODECOMPOSITION OF 2,4,5--TRICHLOROPHENOXYACETIC ACID (2,4,5--T) IN WATER,
California Univ., Davis. Dept. of Environmental Toxicology.
For primary bibliographic entry see Field 05B.
W74-03585

MODIFIED ATOMIC ABSORPTION SPECTROSCOPIC METHODS IN ANALYSES OF TRACE METALS (MODIFIZIERTE ATOMABSORPTIONSSPEKTROSKOPISCHE METHODEN ZUR METALLSPUREN-ANALYTIK),
Farbenfabriken Bayer A. G., Leverkusen (West Germany). Organisch Analytisches Laboratorium.
G. Buttgereit.
Zeitschrift fur Analytische Chemie, Vol 267, No 2, p 81-88, November 1, 1973. 5 fig, 5 tab, 5 ref.

Descriptors: *Spectroscopy, *Trace elements, *Urine, *Metals, Absorption, Viscosity, Surface tension, Mickel, Gold, Iron, Manganese, Lead, Chromium, Cadmium, Aluminum, Calcium, Copper, Mercury, Potassium, Sodium, Cobalt, Molybdenum, Titanium, Zinc, Heavy metals, Magnesium.
Identifiers: *Atomic absorption spectrophotometry, Blood, Biological samples, Serum, Indium, Lithium, Silver, Arsenic, Barium,, Antimony, Selenium, Vanadium, Bismuth.

The basis of this report about atomic absorption spectroscopy with and without flame is the recognition and elimination of interferences. Interferences which are caused by the bonding state of the atoms, background absorption, viscosity and surface tension changes are discussed with the aid of examples for flame AAS including sample boat technique. A laboratory-made device with background compensator for the flameless mercury analysis, and a laboratory-made tantalum furnace for the flameless high temperature method are presented. The interferences by absorption superimpositions and optimizations in the direct analysis of heavy trace metals in urine, blood or serum are discussed in detail for commercial graphite furnaces. (Mortland-Battelle)
W74-03586

CHARACTERIZATION AND MICRODETERMINATION OF A WATER-SOLUBLE METABOLITE FROM BLADEX HERBICIDE BY CONVERSION TO 5,5-DIMETHYLHYDANTION,
Shell Development Co., Modesto, Calif.
S. C. Lau, D. B. Katague, and D. W. Stoutamire.
Journal of Agricultural and Food Chemistry, Vol 21, No 6, p 1091-1094, November/December 1973. 5 fig, 8 ref.

Descriptors: *Herbicides, *Gas chromatography, *Pollutant identification, Cation exchange, Aqueous solutions, Separation techniques, Crops, Soil analysis, Water analysis.
Identifiers: *Bladex hebicide, Gas liquid chromatography, Thin layer chromatography, Cleanup, Metabolites, Electron capture gas chromatography, Sensitivity, Sample preparation, Recovery.

A gas chromatographic method has been designed for the characterization and measurement of Bladex heribicide (propionitrile, 2-4-chloro-6-ethylamino-s-triazin-2-ylamino)-2-methyl-) and its various metabolites. It involves the simultaneous cleavage of the Bladex triazine ring and the cyclization of the characteristic Bladex fragment to 5,5-dimethylhydantoin. Measurement of the 5,5-dimethylhydantoin provides a quantitative assessment of the amount of Bladex and/or its metabolites present. This is readily accomplished by gas-liquid chromatography or by thin-layer chromatography. As an example, a procedure for the electron-capture gas chromatographic determination of a water-soluble metabolite derived from Bladex herbicide by conversion to 5,5-dimethylhydantoin is described. Following the procedure, 1 ng of the metabolite gives 25 percent full-scale response on the gc recorder chart. Recovery data from experiments run on crops and soil were generally in the 75 to 110 percent range when equal amounts of sample and reference solution in the same concentration range were analyzed. A sensitivity of 0.1 ppm is achieved in crops and 0.02 ppm is achieved in soil and water. (Mortland-Battelle)
W74-03587

DETERMINATION OF TRICHLORFON (0,0--DIMETHYL (2,2,2-TRICHLORO-1-HYDROXYETHYL)PHOSPHONATE) IN FOREST ENVIRONMENTAL SAMPLES,
State Univ. Coll., Oswego, N.Y. Lake Ontario Environmental Lab.
J. M. Devine.
Journal of Agricultural and Food Chemistry, Vol 21, No 6, p 1095-1098, November/December 1973. 2 fig, 2 tab, 4 ref.

Descriptors: *Gas chromatography, *Pesticides, *Pollutant identification, Vegetation, Soils, Mud, Separation techniques, *Water analysis, *Soil analysis, Aqueous solutions, Pesticide residues, Flame photometry, Activated carbon, Stability, Leaves.
Identifiers: *Trichlorfon, Environmental samples, Tissue, Cleanup, Storage, Biological samples, Recovery, Sample preparation, Sample preservation, Chromatograms, Twigs.

A gas chromatographic method is described for the determination of trichlorfon (0,0-dimethyl (2,2,2-trichloro-1-hydroxyethyl)phosphonate) in various forest environmental samples such as leaves, twigs, forest litter, soil, mud, water, aquatic vegetation, and animal tissues. Trichlorfon residues were removed with chloroform. Animal extracts were processed through hexane-water and water-chloroform partition steps to remove lipid materials. Forest extracts were cleaned up with Nuchar C-190N activated carbon. Determination of trichlorfon was made with a gas chromtograph equipped with a flame photometric detector in the phosphorus mode. Recovery from the various types of samples averaged 96 percent. The method is senistive to 0.002 ppm for water and 0.05 ppm for all other sample types. (Mortland-Battelle)
W74-03588

ELEMENT SPECIFIC GAS CHROMATOGRAPHIC ANALYSES OF ORGANOCHLORINE PESTICIDES IN THE PRESENCE OF PCB'S BY SELECTIVE CANCELLATION OF INTERFERING PEAKS,
Michigan Dept. of Public Health, Lansing.
G. C. C. Su, and H. A. Price.
Journal of Agricultural and Food Chemistry, Vol 21, No 6, p 1099-1102, November/December 1973. 4 fig, 4 tab, 24 ref.

Descriptors: *Aroclors, *Gas chromatography, *Chlorinated hydrocarbon pesticides, Polychlorinated biphenyls, *Pollutant identification.
Identifiers: Electrolytic conductivity detector, Chemical interference.

Polychlorinated biphenyl interference-free qualitative and quantitive gas chromatographic (gc) analyses of beta-BHC, oxychlordane, heptachlor epoxide, p,p'-DDE, o,p-DDT, p,p'-DDD, p,p'-DDT, and Mirex in the 10-25 ng range have been carried out in the presence of approximately 10 to 20 times their concentrations of Aroclors 1232, 1248, 1254, and 1260 by the use of the Coulson electrolytic conductivity detector in the noncatalytic reductive mode. No modification of the detector system was necessary except to set the detector's reactor temperature at 660 degrees. The results of individual analyses in most instances were within plus or minus 20 percent of the actual value. The operating parameters of the Coulson conductivity detector for gc in the noncatalytic reductive mode are as follows: conductivity bridge voltage, 30 V; conductivity bridge attenuation, 1; furnace (reactor) temperature, 660-840 degrees; transfer block temperature, 250 degrees; hydrogen flow rate through reactor, 40 ml/min; nitrogen flow rate through reactor, 100 ml/min; gas chromatograph column temperature, 200 degrees; sample size, 5 microliters. (Mortland-Battelle)
W74-03589

DIBUTYL- AND DI- (2-ETHYLHEXYL)PHTHALATE IN FISH,
Food and Drug Directorate, Ottawa (Ontario). Food Research Labs.
D. T. Williams.
Journal of Agricultural and Food Chemistry, Vol 21, No 6, p 1128-1129, November/December 1973. 1 tab, 10 ref.

Descriptors: *Freshwater fish, *Marine fish, Crabs, Clams, Oysters, Shrimp, Separation techniques, Foods, Canada, *Gas chromatography, *Pollutant identification.
Identifiers: Biological samples, Sample preparation, *Dibutylphthalate, di- (2-Ethylhexyl)phthalate, Gas liquid chromatography, Recovery, GC-mass spectrometry, Scallops.

Twenty-one samples of canned seafoods and fish from Canadian lakes and rivers were analyzed by GLC and GLC-mass spectrometry for dibutylphthalate (DBP) and di- (2-ethylhexyl)phthalate (DEHP). Samples were chopped, macerated manually, and extracted three times by heating with hexane. The hexane solutions were concentrated, extracted with acetonitrile saturated with hexane, and concentrated again. m-Chloroperbenzoic acid and sulfuric acid were added and the solution let stand overnight. After adding water, the solution was extracted with petroleum ether, the extract dried, concentrated, transferred to a silica gel column made up with ethyl ether in petroleum ether, eluted, and the eluate examined by GLC. CLC-mass spectrometry was used for confirmation of phthalate esters at concentrations five times greater than background levels. Recove-

ries were 60-65 percent for DBP and 65-70 percent for DEHP. Concentrations found were 0-78 ppb DPB and 0-160 ppb DEHP in the 21 samples. (Little-Battelle)
W74-03590

BACTERIAL DECOMPOSITION PROCESSES IN LAKE WINGRA SEDIMENTS DURING WINTER,
Wisconsin Univ., Madison. Dept. of Bacteriology.
C. W. Boylen, and T. D. Brock.
Limnology and Oceanography, Vol 18, No 4, p 628-634, July 1973. 2 fig, 2 tab.

Descriptors: *Lake sediments, *Cultures, *Bacteria, *Growth rates, Water temperature, *Wisconsin, *Degradation (decomposition), Adaptation, *Metabolism, Bioassay, Sediments, Radioactivity techniques, Dissolved oxygen, Temperature, Seasonal, Cold resistance, Carbon dioxide, Primary productivity.
Identifiers: *Lake Wingra (Wis), Incubation, Scintillation counting, Bacterial physiology.

Samples of sediment were collected from Lake Wingra, Wisconsin, from January 19 - July 21, 1972, for use in tests to determine whether bacteria in sediments adapted to low temperatures. Samples were collected with a type R sampler, transferred to collection bottles, and kept at 4 C until use. DO and air, water, and sediment temperatures were recorded at the time of sampling. Glucose incorporation was measured by adding C-14-labeled material to sediment suspensions and incubating in the dark at temperatures of 0 to 50C. Release of C-14-labeled CO2 was measured by trapping it in scintillation fluid. Growth rates were studied by preparing cultures of the sediment bacteria for incubation at 4,115, and 25C. The results show that viable counts of bacteria were always higher at 25C that 4C, although the temperature of the sediments remained below 4C for over 3 months. All of the organisms isolated and initially cultivated at 4C grew better at 25C; no obligately psychrophilic bacteria were found. Isotope studies to measure the temperature optima of the resident bacterial flora showed that the optimum temperature for incorporation of C-14-glucose into cell material and conversion of C-14-glucose into C-14-CO2 remained at 25C or greater all winter. A true psychrophilic flora does not develop in these sediments in winter, and bacterial decomposition processes occur at a much slower rate in winter than in summer. (Little-Battelle)
W74-03592

SYNCHRONOUS CULTURES OF BACILLUS SUBTILLE OBTAINED BY FILTRATION WITH GLASS FIBER FILTERS,
National Inst. for Medical Research, London (England).
M. G. Sargent.
Journal of Bacteriology, Vol 116, No 2, p 736-740, November 1973. 3 fig, 2 tab, 16 ref.

Descriptors: *Filters, *Bacteria, *Cultures, Cytological studies, Radioactivity techniques, Size, Growth rates, Proteins, Synthesis, Filteration, Spores, Germination, Distribution, Separation techniques.
Identifiers: *Bacillus subtilis, Synchronous cultures, DNA, Coulter counter, Culture media.

A simple method of potentially wide applicability for obtaining synchronous cultures of Bacillus subtilis based on size selection is described. Using glass fiber filters, a population (about 1 to 2 percent of the parent population) can be obtained substantially enriched for small cells which grow synchronously. A method for rapidly concentrating dilute suspensions of cells is described. Batches of cells (500 ml) at an optical density (OD) of 1.5 to 2.0 (540 nm) were placed in the filtration unit, and the water pump was started. For most purposes the negative pressure was increased steadily from 0 to about 15 cm of mercury. By changing the filters once, 1 liter of selected cells (yield about 4 percent) could be obtained in 2 min. Further selection and concentration was achieved by passing the filtrate through another pad of glass fiber filters, a collection filter (GF/C, 5.5 cm) (mounted in a smaller apparatus), at a negative pressure of 30 to 40 cm of mercury. The increase in retentiveness at high negative pressures provides an especially useful method of combining a selection and concentration step. Cells obtained by filtration in this way grow synchronously. (Mortland-Battelle)
W74-03599

GLUCOSE AND PYRUVATE METABOLISM OF SPIROCHAETA LITORALIS, AN ANAEROBIC MARINE SPIROCHETE,
Massachusetts Univ., Amherst. Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-03600

INVESTIGATION OF THE ENERGETICS OF METHANE-UTILIZING BACTERIA IN METHANE- AND OXYGEN-LIMITED CHEMOSTAT CULTURES,
Tokyo Univ. (Japan). Inst. of Applied Microbiology.
S. Nagai, T. Mori, and S. Aiba.
Journal of Applied Chemistry and Biotechnology, Vol 23, No 7, p 549-562, July 1973. 7 fig, 1 tab, 16 ref.

Descriptors: *Methane bacteria, *Cultures, *Oxygen, *Methane, Growth rates, Absorption, Respiration, Dissolved oxygen.
Identifiers: *Chemostat cultures, Dilution rate, Continuous cultures, Aerobacter aerogenes, Azotobacter vinelandii, Saccharomyces cerevisiae, Energetics, Culture media.

A special apparatus was used to establish methane- and oxygen-limited chemostat cultures of a methane-utilizing bacterium, at 30C, pH equals 7.0, respectively. The characteristic feature of this arranagement is a complete absence of direct gassing with both methane and air (oxygen). Instead, two vessels (initial working volume equals 3 1, magnetically stirred) were provided in which fresh medium was saturated separately with methane and oxygen; the medium, saturated with either methane or oxygen, was then charged separately into the culture vessel (working volume equals 1 litre, placed on a magnetic stirrer) using a peristaltic pump. The culture vessel was filled up with the medium after inoculation from the preculture so as to provide a cell mass concentration of nearly 10 mg/l. Although total growth yields with respect to methane and oxygen were hardly affected by dissolved oxygen concentration in the medium, provided dilution rate was kept nearly at 0.1/hr, these values appeared to increase slightly with the increase of dilution rate. Assuming that no metabolites other than carbon dioxide and water were produced during bacterial growth, maintenance coefficients and true growth yields were assessed from specific rates of methane uptake and respiration. These energetic constants, nearly independent of the limiting substrates, either methane or oxygen, were compared with those from published data on facultative and obligate aerobes, including a mixed culture of methane-utilizing bacteria. (Mortland-Battelle)
W74-03601

METHYLMERCURY IN ESTUARINE SEDIMENTS,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-03602

DETERGENT AND NON-DETERGENT PHOSPHORUS IN SEWAGE,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 05B.
W74-03606

INSTRUMENTATION FOR WATER POLLUTION MONITORING,
Honeywell, Inc., Fort Washington, Pa.
For primary bibliographic entry see Field 05D.
W74-03640

5B. Sources of Pollution

PARABIOTIC GROWTH CHARACTERISTICS OF SELECTED SEWAGE BACTERIA,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 05C.
W74-03203

ANALYSIS OF THE BENTHIC MACROINVERTEBRATE COMMUNITY STRUCTURE FOR ASSESSMENT OF WATER QUALITY OF DES MOINES RIVER,
Drake Univ., Des Moines, Iowa.
For primary bibliographic entry see Field 05C.
W74-03210

SPECIES DIVERSITY OF BENTHIC MACROINVERTEBRATES IN THE DES MOINES RIVER, IOWA,
Drake Univ., Des Moines, Iowa.
For primary bibliographic entry see Field 05C.
W74-03211

PROCEEDINGS, MISSISSIPPI WATER RESOURCES CONFERENCE, 1973.
Mississippi State Univ., State College. Water Resources Research Inst.

Available from the National Technical Information Service as PB-226 766; $7.75 in paper copy, $1.45 in microfiche. Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, Vicksburg, 1973. 108 p.

Descriptors: *Conferences, *Water resources, *Mississippi, *Information exchange, *Water resources development, Documentation, Water quality control, Surface waters, Groundwater, Water pollution control, Reviews, Evaluation, Environmental control, Erosion control, Pollution abatement, Watershed management, Estuaries, Gulf of Mexico, Water pollution sources.
Identifiers: *Symposium.

The eighth Mississippi Water Resources Conference was held in Vicksburg on April 10-11, 1973, for the purpose of exchanging information pertaining to water resources. For various reasons, some of the papers presented at the conference are not included in this report. However, arrangements have been made so that some of those papers which are not included will later be published as separate bulletins. The 9 papers included in this report are: Nitrogen, Phosphorus and Other Chemicals in Sediments from Reservoirs in North Mississippi; Sediment Yield Estimates Based on Floodwater Measurements and Samples; Environmental Aspects of Watershed Planning; Response of the Lower Mississippi River to Changes in Valley Slope, Sinuosity and Water Temperature; Mathematical Modeling of Water Quality; Multiple Outlet Selective Withdrawal Technique for Water Quality Prediction of Lake Releases; Monitoring Nutrient Losses from Small Watersheds; Look, No Clarifier; and Treatment of Domestic Sewage at Offshore Locations. (See also W74-03213 thru W74-03221) (Woodard-USGS)
W74-03212

NITROGEN, PHOSPORUS AND OTHER CHEMICALS IN SEDIMENTS FROM RESERVOIRS IN NORTH MISSISSIPPI,
Mississippi Univ., University.
J. R. McHenry, J. C. Ritchie, and A. C. Gill.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 1-12, 1973. 6 tab, 8 ref.

Descriptors: *Sediments, *Reservoirs, *Chemical analysis, *Mississippi, *Pollutant identification, Organic matter, Phosphates, Nitrates, Potassium, Particle size, Clays, Sands, Flood control, Erosion control, Sediment control, Path of pollutants, Fertilizers, Sediment transport.
Identifiers: *Tallahatchie River basin (Miss), *Yazoo River tributary (Miss).

Sediment and soil samples were collected in 1969, 1970, and 1971 from five reservoirs and watersheds in the hill country of northern Mississippi. The watersheds range in size from half a square mile to 1,545 square miles. Four of the watersheds are in the Tallahatchie River basin above Sardis Dam; the fifth is in Tallahatchie County on a tributary of the Yazoo River. Sardis Reservoir was built as a flood control structure. The smaller dams were designed for both flood and sediment control. Sediments were enriched in clay but contained less organic material than the sampled surface soils from the contributing watershed. The enrichment of these sediments with clay reflects both the trap efficiency of the reservoirs for sediments and the selective segregation of eroded particles that occurs in the transport and deposition processes. The larger particles move slower in transport than do the finer particles, and hence are deposited first in the slackwater above the reservoir or in the upper end of the conservation pool (delta area). The lack of enrichment of these sediments in organic material (nitrogen, carbon, oxidizable matter) reflects the relative low organic content of the soils in the hill area of north Mississippi and the large contribution to sediments from gully and other nonsheet erosion processes. (See also W74-0312) (Woodard-USGS)
W74-03213

SEDIMENT YIELD ESTIMATES BASED ON FLOODWATER MEASUREMENTS AND SAMPLES,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 02J.
W74-03214

ENVIRONMENTAL ASPECTS OF WATERSHED PLANNING,
Soil Conservation Service, Jackson, Miss.
For primary bibliographic entry see Field 06G.
W74-03215

RESPONSE OF THE LOWER MISSISSIPPI RIVER TO CHANGES IN VALLEY SLOPE, SINUOSITY AND WATER TEMPERATURE,
Army Engineer District, Vicksburg, Miss.
For primary bibliographic entry see Field 02E.
W74-03216

MATHEMATICAL MODELING OF WATER QUALITY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. G. Fontane.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 49-58, 1973. 2 fig, 1 plate, 4 ref, append.

Descriptors: *Environmental control, *Water quality control, *Water pollution control, *Model studies, *Water quality, Mathematical models, Analog models, Reviews, Evaluation.
Identifiers: Physical models.

Concern with the environment has made it necessary to attempt to assess the environmental impact of proposed water resource projects. Whether the project is a waste discharge into a waterway or a large impoundment, the engineer must try to determine the effect of the project on the physical, chemical, and biological characteristics of the existing water resource system. Generally this determination can best be made through the use of a model to represent the existing system. The model can then be modified by the proposed project and the effect observed over space and time. Three types of models are discussed: a physical model, an analog model, and the mathematical model. Mathematical models for water quality parameters are constantly being improved and new models being developed. As new mathematical techniques become available, more complex relationships can be analyzed and the need for simplifying assumptions reduced. (See also W74-03212) (Woodard-USGS)
W74-03217

MULTIPLE OUTLET SELECTIVE WITHDRAWAL TECHNIQUE FOR WATER QUALITY PREDICTION OF LAKE RELEASES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
T. L. Gloriod.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 59-73, 1973. 7 fig, 5 plate.

Descriptors: *Water quality control, *Streams, *Flow control, *Reservoir releases, *Mississippi, Methodology, Water quality, Water temperature, Stratification, Lakes, Flow control, Flow augmentation, Dams, Water levels.
Identifiers: Optional vertical reservoir releases.

The demands on multipurpose reservoir planning, design, and operation for quality releases have played a significant role in evaluating both existing and planned projects in Mississippi. The desire to meet downstream water quality criteria without diminishing the quantity has necessitated research aimed at the development of techniques useful to the project designer and operator in meeting these downstream goals. One technique is selective withdrawal, whereby reservoir outlet ports are located at various levels enabling releases to be taken from one or more of several different strata. These 'multiple choice' outlet releases are evaluated. Generally, downstream water quality goals center about the temperature of the water. However, thermal phenomena in terms of water quality may bring about differences in the concentration of dissolved oxygen, pH, and suspended solids; so much that thermal stratification in reservoirs can be thought of as quality stratification. (See also W74-03212) (Woodard-USGS)
W74-03218

MONITORING NUTRIENT LOSSES FROM SMALL WATERSHEDS,
Tennessee Valley Authority, Muscle Shoals, Ala. Soils and Fertilizer Research Branch.
V. J. Kilmer, and R. T. Joyce.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 75-86, 1973. 2 tab, 18 ref.

Descriptors: *Water quality, *Nutrients, *Fertilizers, *Small watersheds, *Southeast U.S., Surface waters, Groundwater, Sediment transport, Sediments, Reviews, Evaluation, Water pollution sources, Path of pollutants.

The southeastern United States is a region where fertilizer use and precipitation are relatively high. During 1972 a total of 10.7 million tons of fertilizer materials were used which included 1.4, 0.9, and 1.2 million tons of N, P205, and K20, respectively. The average annual precipitation ranges between 50-60 inches over most of the region; 40% to 70% of this precipitation is lost as runoff. Evapotranspiration normally exceeds precipitation from early spring to early fall over much of the area. These characteristics would appear to favor the transport of native soil and fertilizer nutrients to surface and groundwater, particularly during the winter and early spring. However, there is little indication that fertilizer nutrients, particularly N, will accumulate in surface or groundwater except where such water remains stagnant or nearly so. Several studies of nutrient transport in watersheds are reviewed and evaluated. (See also W74-03212) (Woodard-USGS)
W74-03219

LOOK, NO CLARIFIER,
Mississippi Power and Light Co., Vicksburg.
For primary bibliographic entry see Field 05F.
W74-03220

TREATMENT OF DOMESTIC SEWAGE AT OFFSHORE LOCATIONS,
Linfield and Hunter, Inc., Vicksburg, Miss.
For primary bibliographic entry see Field 05D.
W74-03221

EFFECTS OF WASTE PERCOLATION OF GROUNDWATER IN ALLUVIUM NEAR BARSTOW, CALIFORNIA,
Geological Survey, Garden Grove, Calif.
For primary bibliographic entry see Field 05E.
W74-03228

FEASIBILITY STUDY OF A SEISMIC REFLECTION MONITORING SYSTEM FOR UNDERGROUND WASTE-MATERIAL INJECTION SITES,
Petty-Ray Geophysical Group, San Antonio, Tex.
F. J. Barr, Jr.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 207-218, 1973. 10 fig, 9 ref.

Descriptors: *Waste disposal wells, *Monitoring, *Seismic studies, Water pollution control, Path of pollutants, Data collections, Data processing.

An effective method of monitoring the movement and distribution of injected waste materials is needed: In most cases, the acoustical properties of the receiving formation (its density and the velocity of propagation of compressional sound waves) will be changed upon contact with the injected waste materials. These changes will subsequently change the reflection coefficient encountered by a vertically traveling sound wave at the receiving formation. This change in acoustical properties suggests the application of modern seismic reflection and data-processing techniques to this monitoring problem. The use of the seismic method on a periodic basis is proposed to detect changes of acoustical properties in the receiving formation and surrounding formations to monitor effectively the movement and position of the waste materials. The assumed seismic field system for this monitoring system includes the following components: (1) permanent arrays of velocity geophones buried a small distance below the surface of the earth, (2) a multichannel digital recording system of the instantaneous-floating-point type, (3) truck-mounted seismic surface energy sources, and (4) the use of digital seismic data-processing center. (See also W74-03222) (Knapp-USGS)
W74-03230

RADIOACTIVE- AND CHEMICAL-WASTE TRANSPORT IN GROUNDWATER AT NATIONAL REACTOR TESTING STATION, IDAHO: 20-YEAR CASE HISTORY AND DIGITAL MODEL,
Geological Survey, Idaho Falls, Idaho.
J. B. Robertson, and J. T. Barraclough.

In: Underground Waste Management and Artificial Recharge, Vol 1, p 291-322. 1973. 16 fig, 2 tab, 9 ref.

Descriptors: *Radioactive wastes, *Groundwater movement, *Waste disposal wells, *Path of pollutants, *Idaho, Tritium, Chlorides, Strontium radioisotopes, Cesium, Cobalt radioisotopes, Ion exchange, Alluvium, Dispersion, Simulation analysis, Mathematical models.

Industrial and low-level radioactive liquid wastes at the National Reactor Testing Station (NRTS) in Idaho have been discharged to the Snake River Plain aquifer since 1952. The waste discharge to the aquifer at NRTS, which has averaged about 1 billion gal per year, contained small quantities of tritium, Sr-90, Cs-137, Co-60, chloride, hexavalent chromium, various acids and bases, and heat. Tritium and chloride have dispersed over a 15-sq-mi area of the aquifer in low but detectable concentrations and have migrated as much as 5 mi downgradient from discharge points. The movement of cationic waste solutes, particularly Sr-90 and Cs-137, has been significantly retarded owing to sorption phenomena, principally ion exchange. Sr-90 has migrated only about 1.5 mi from a discharge well. A digital model includes the effects of convective transport, flow divergence, two-dimensional hydraulic dispersion, radioactive decay, and reversible sorption. The 20-year transport and distribution history of waste chloride and tritium has been successfully simulated by the model. (See also W74-03222) (Knapp-USGS)
W74-03233

MODIFICATION OF ARTIFICIALLY RECHARGED WATER IN SWITZERLAND,
H. Schmassmann.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 323-334. 1973. 9 fig, 1 tab.

Descriptors: *Artificial recharge, *Waste water disposal, Water treatment, Waste treatment, Oxygen demand, Percolation, Water purification, Gravels, Alluvium, Groundwater movement.
Identifiers: *Switzerland.

In some artificial-recharge plants in Switzerland, Pleistocene gravels are artificially replenished by polluted river water and recharge capacities are from 1 to 25 million gal/day. The retention time of the individual water particles is considerably varied and depends on hydraulic dispersion. The oxygen content of the artificially recharged groundwaters depends on the oxygen concentration and on the biochemical oxygen demand of the raw water. There are no significant differences in oxygen balance between percolative and direct infiltration, probably because significant quantities of oxygen are no longer present after the first percolative seepage of polluted raw water in an unsaturated zone above the water table. After infiltration, aerobic decomposition of organic matter and elimination of bacteria generally require short flow times. High oxygen content and low biochemical oxygen demand of the raw water, together with long retention times, are the most important factors in modification of river water to a wholesome drinking water by artificial recharge. (See also W74-03222) (Knapp-USGS)
W74-03234

HYDRODYNAMICS OF MOUNT SIMON SANDSTONE, OHIO AND ADJOINING AREAS,
Geological Survey, Columbus, Ohio.
M. J. Clifford.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 349-356, 1973. 6 fig, 2 tab, 5 ref.

Descriptors: *Path of pollutants, *Waste disposal wells, *Hydrogeology, *Ohio, Underground waste disposal, Injection wells, *Sandstones, Aquifer characteristics, Velocity.
Identifiers: Mount Simon Sandstone.

The Mount Simon Sandstone (Cambrian), the most favorable stratum for waste injection in Ohio, presently accepts about 250 million gal of industrial waste per year. The potentiometric-surface map mirrors the structural configuration; highest values are in the deeper part of the Appalachian basin and lowest values are on the Indiana-Ohio platform. Flow direction in central Ohio is west or northwest. Head difference is 2-7 ft. Velocities are less than 6 inches per year. These calculations show that transport of injected fluids by hydrodynamic flow is not presently a serious hazard in Ohio. (See also W74-03222) (Knapp-USGS)
W74-03235

RETENTION OF DISSOLVED CONSTITUENTS OF WASTE BY GEOLOGIC MEMBRANES,
Geological Survey, Menlo Park, Calif.
Y. K. Kharaka.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 420-435, 1973. 6 fig, 1 tab, 18 ref.

Descriptors: *Groundwater movement, *Path of pollutants, *Membrane processes, *Ion transport, Ion exchange, Mass transfer, Clays, Shales, Clay minerals, Waste disposal wells, Underground waste disposal.

Clays and shales are semipermeable membranes, retarding by varying degrees the passage of the dissolved species with respect to water. The relative retardation by geologic membranes of cations and anions generally present in waste solutions was investigated using a high-pressure and high-temperature filtration cell. The solutions were forced with varied hydraulic gradients through different clays and a disaggregated shale subjected to compaction pressures up to 10,000 psi and to temperatures from 20-70 deg C. The membrane efficiencies increased with increase of exchange capacity and with decrease in concentration of the input solution. The efficiency of a given membrane increased with increasing compaction pressure but decreased at higher hydraulic gradients. The degree of retardation is different for different dissolved species. The retardation sequences for monovalent and divalent cations were generally as follows: Li< Na< NH3< K< Rb< Cs and Mg< Ca< Sr< Ba. Anion sequence was: HCO3< I< B< SO4< Cl< Br. (See also W74-03222) (Knapp-USGS)
W74-03238

HYDROGEOLOGIC STUDIES AT A SUBSURFACE RADIOACTIVE-WASTE-MANAGEMENT SITE IN WEST-CENTRAL CANADA,
Waterloo Univ. (Ontario). Dept. of Earth Sciences.
For primary bibliographic entry see Field 05E.
W74-03239

GEOHYDROLOGY OF BURIED TRIASSIC BASIN AT SAVANNAH RIVER PLANT, SOUTH CAROLINA,
Du Pont De Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 05E.
W74-03241

ROLE OF BACTERIA IN DECOMPOSITION OF INJECTED LIQUID WASTE AT WILMINGTON, NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Microbiology.
A. DiTommaso, and G. H. Elkan.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 585-599, 1973. 4 fig, 5 tab, 4 ref.

Descriptors: *Underground waste disposal, *Waste disposal wells, *Biodegradation, *Bacteria, Monitoring, Industrial wastes, Path of pollutants, Injection wells, *North Carolina, Liquid wastes.

In 1968, Hercules Chemical, Inc., Wilmington, North Carolina, began injecting organic waste through wells into a saline disposal zone at depths of 850 to 1,000 ft. The waste, which is a byproduct of dimethylterephthalate used in the production of synthetic fiber, is composed of water containing approximately 15,000 ppm of acetic acid, 5,000 ppm of formic acid, and 500 ppm of methanol, with a pH of about 4.0. The movement and composition of the transformed waste are monitored by a network of 14 observation wells. The microorganisms in the unpolluted aquifer were isolated and identified. Genera include Agrobacterium, Pseudomonas, Bacillus, Arthobacter, Aerobacter, Corynebacter, and Staphylococcus. Appearance of the waste front at monitoring wells was accompanied by a rapid increase in the bacterial population. These bacteria utilized the waste as a source of carbon and energy while receiving their nitrogen from the groundwater. The aquifer supplied various tract elements which the organisms need for growth. Bacteria in the aquifer have the capability for causing decomposition, but cannot decompose the waste at the rate at which it is being injected. (See also W74-03222) (Knapp-USGS)
W74-03246

HISTORY OF A TWO-WELL INDUSTRIAL--WASTE DISPOSAL SYSTEM,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 05E.
W74-03247

SODIUM/POTASSIUM RATIO IN WATER OF THE DON RIVER (SOOTNOSHENIYE NATRIYA I KALIYA V VODE R. DONA),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
G. S. Konovalov, V. I. Koreneva, and A. M. Klepeshnev.
In: Formirovaniye khimicheskogo sostava poverkhnostnykh vod i metody ikh analiza: Gidrokhimicheskiye Materialy, Vol 57, p 22-29, 1973. 2 fig, 2 tab, 8 ref.

Descriptors: *Water chemistry, *Sodium, *Potassium, *Rivers, Tributaries, Inorganic compounds, Water analysis, Water sampling, Variability.
Identifiers: *USSR (Don River), *Mineralization.

Temporal changes in sodium and potassium concentrations in river water were investigated in the Don River at Aksay in 10-day determinations of these elements from April 3, 1969 through June 30, 1970. Variations in sodium concentration in Don River water agree well with changes in total mineralization of water. No clear relation is observed between potassium concentration and total mineralization of river water. As a result of the influence of tributaries and highly mineralized groundwater, sodium in Don River water at Aksay during low flows is one of the predominant cations. Temporal variability of potassium concentration in Don River water at Aksay is small. The slight increase in pottassium concentration during the flood of April 1970 was caused by leaching of potassium-bearing organic residues from the soil surface by melt waters. The sodium/potassium ratio in Don River water varies widely, between 14 and 47.5. Variations in this value agree largely with changes in sodium concentration in time. (Josefson-USGS)
W74-03253

DISTRIBUTION PATTERNS OF ORGANIC MATTER IN RIVER WATERS OF THE WOODED TUNDRA ZONE (ZAKONOMERNOSTI RASPREDELENIYA OR-

GANICHESKOGO VESHCHESTVA RECHNYKH VOD LESOTUNDROVOY ZONY),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
For primary bibliographic entry see Field 02K.
W74-03255

CHANGES IN CHEMISTRY OF NATURAL WATERS OF CULTIVATED LANDS (IZMENENIYA KHIMIZMA PRIRODNYKH VOD KUL'TURNYKH LANDSHAFTOV),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
G. S. Shil'krot.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 3, p 42-50, May-June 1973. 2 tab, 27 ref.

Descriptors: *Water pollution, *Water chemistry, Runoff, *Leaching, *Cultivated lands, Inorganic compounds, Nutrients, Surface waters, Surface runoff, Agricultural runoff, Overland flow, Groundwater, Base flow, Precipitation (Atmospheric), Wastes.
Identifiers: USSR.

Effects of man on changes in chemical composition of natural waters and on increased concentrations of phosphorus and nitrogen in surface waters and groundwater are discussed. Participating in these processes are atmospheric precipitation, domestic and industrial waste waters, and agricultural runoff. Effects of domestic and industrial wastes are analyzed together with the changing role of soils in the formation of the composition of natural waters during intensive introduction of chemical processes into agriculture. (Josefson-USGS)
W74-03257

CUMULATION OF RADIOACTIVE SUBSTANCE IN DAM RESERVOIRS,
Instytut Gospodarki Kommunalnej, Chorzow (Poland). Samodzielna Pracowniz Radioekologii.
J. Kwapulinski.
Acta Hydrobiologica. Cracow, Vol 15, No 2, p 215-225, 1973. 5 fig, 3 tab, 12 ref.

Descriptors: *Radioisotopes, *Benthos, *Periphyton, *Phytoplankton, *Zooplankton, *Bottom sediments, Aquatic plants, *Bioindicators, Radioactive wastes, Absorption, Water pollution effects, Reservoirs, Adsorption, Radioactivity.
Identifiers: *Poland, Biological magnification, Bioaccumulation, Macroinvertebrates.

Benthos, periphyton, phytoplankton, zooplankton, bottom sediment, and higher plant samples were obtained from one rheolimnic and two limnic reservoirs to investigate the accumulation of radioisotopes in the various components. Three accumulation values were calculated for sediments and periphyton by dividing sample concentration by (1) specific water concentration or (2) by the mean concentration for water, and (3) by dividing mean sample concentration by mean water concentration. Values for other organisms were obtained using specific sample values and mean water values. The sediments accumulated radioisotopes 1,600 to 9,500 times depending on the type of sediment and hydrologic conditions. Periphyton accumulations ranged from 100 to 98,000 times. Other accumulations were: benthos, 5,900-12,000 times; zooplankton, 4,300-7,400 times; phytoplankton, 7,200-13,000 times; and aquatic plants, 8,700-40,000 times. It is concluded that because of the large uptake abilities of the sediments and organisms, self-purification processes are active in the reservoirs except in the event of turbulence when recontamination occurs. Periphyton should be useful as bioindicators of beta radioactivity contamination and also provide useful information on previous contamination levels. (Little-Battelle)
W74-03272

NITROGEN FIXATION BY THE UNICELLULAR BLUE-GREEN ALGA APHANOTHECE,
Central Rice Research Inst., Cuttack (India). Dept. of Blue-Green Algae.
For primary bibliographic entry see Field 05C.
W74-03278

GERMANIUM INCORPORATION INTO THE SILICA OF DIATOM CELL WALLS,
California Univ., San Diego, La Jolla.
For primary bibliographic entry see Field 05C.
W74-03280

BIODEGRADATION OF UREA IN RIVER WATERS UNDER CONTROLLED LABORATORY CONDITIONS,
Laboratory of the Government Chemist, London (England).
W. H. Evans, E. J. David, and S. J. Patterson.
Water Research Vol 7, No 7, p 975-985, July 1973. 7 fig, 3 tab, 7 ref.

Descriptors: *Ureas, *Biodegradation, *Laboratory tests, Rivers, Ammonia, Water temperature, Water analysis, Chemical analysis, Nitrites, Nitrates, Hydrogen ion concentration, Suspended solids, Aerobic conditions, Anaerobic conditions, Nitrification, Chemical reactions, Nitrogen cycle.
Identifiers: *Natural waters, Degradation rates, Degradation products.

The biodegradation of urea in river waters has been evaluated under laboratory conditions. Urea will degrade to ammonia at a rate depending on the bacterial state of the river water and on the water temperature. Under normal conditions no breakdown may be expected to occur at temperatures below 8C for 14 days contact. In river waters with a high suspended solids content, simulating extreme winter river conditions, a maximum breakdown of 3-6 percent daily of the original urea levels was found for temperature not exceeding 8C during the first 7 days contact. (Holoman-Battelle)
W74-03287

VIRUS REMOVAL IN HAWAIIAN SOILS,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 05F.
W74-03293

DISPERSION IN HYDROLOGIC AND COASTAL ENVIRONMENTS,
California Inst. of Tech., Pasadena. W. M. Keck Lab. of Hydraulics and Water Resources.
N. H. Brooks.
Copy available from GPO Sup Doc as EP1.23:660-73-010, $1.55; microfiche from NTIS as PB-226 890, $1.45. Environmental Protection Agency, Ecological Research Series, Report EPA-660/3-73-010, August 1973. 136 p, 37 fig, 132 ref. EPA Project 16070 DGY.

Descriptors: *Jets, Stratified flow, Reservoirs, Withdrawal, *Turbulent flow, Mixing, Diffusion, Abstracts, *Outlets, Outfall sewers, Thermal pollution, Waste dilution, Bibliographies, *Dispersion, Coasts, *Path of pollutants, Water pollution sources.
Identifiers: Buoyant jets.

Results are summarized of a five-year laboratory research project on various flow phenomena of importance to transport and dispersion of pollutants in hydrologic and coastal environments. The results are useful in two general ways: first, to facilitate the prediction of ambient water quality from effluent characteristics in various water environments; and secondly, to provide the basis for design of systems (like outfalls) required to meet given ambient water quality requirements. The results for buoyant jets may be used for the design of waste-water outfalls in oceans, reservoirs, lakes, and large estuaries. Particular emphasis is given to line sources (or slot jets) which represent long multiple-outlet diffusers, which are necessary for all large discharges to get high dilutions. For reservoirs which are density stratified, the results include formulations for prediction of selective withdrawal, and a simulation procedure for predicting reservoir mixing by systems which pump water from one level to the other. For applications to rivers and estuaries, laboratory flume experiments were made to measure transverse mixing of buoyant or heavy tracer flows, as well as for neutral-density flows. Abstracts of all publications and reports resulting from the project are given as an appendix to the report. (EPA)
W74-03327

CHEMISTRY OF ORGANOMERCURIALS IN AQUATIC SYSTEMS,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
G. L. Baughman, J. A. Gordon, N. L. Wolfe, and R. G. Zepp.
Copy available from GPO Sup Doc as EP1.23:660-73-012, $1.30; microfiche from NTIS as PB-226 889, $1.45. Environmental Protection Agency, Ecological Research Series, Report EPA-660/3-73-012, September 1973. 97 p, 20 fig, 16 tab, 102 ref. EPA Project 310301 QQG.

Descriptors: *Heavy metals, *Hydrolysis, *Kinetics, Metal organic pesticides, Chemical degradation, Aqueous solutions, Water chemistry, Evaporation, Air-water interfaces, *Mercury, Water pollution sources.
Identifiers: *Photolysis, *Organomercury, Photodegradation, Complex formation, Methylmercury, Phenylmercury, Diphenylmercury, Dimethylmercury.

Kinetics in water of some chemical and photochemical reactions postulated as key transformations in the environmental mercury cycle were investigated. Decomposition of dimethylmercury (DMM) and diphenylmercury (DPM) by acids and mercuric salts was shown to be pH dependent and too slow to be significant under most environmental conditions. Degradation of organomercuric salts by acid is even slower. Theoretical evidence indicates that loss of elemental mercury or DMM at the air-water interface can be important in turbulent systems. Dimethylmercury, methylmercuric chloride, methylmercuric hydroxide, and methylmercuric ion were not decomposed by sunlight, but phenylmercury and sulfur-bonded methylmercuric species were readily decomposed to inorganic mercury. Detailed equilibrium calculations indicate that the sulfur-bonded methylmercuric species are the predominant species in natural waters. Quantum yields for these reactions are presented along with a technique for calculating sunlight photolysis rates from laboratory data. A review is included of the chemical literature concerning the kinetics of chemical and photochemical decomposition of organomercurials. (Baughman-EPA)
W74-03328

ENRICHMENT OF MARSH HABITATS WITH ORGANIC WASTES,
Louisiana Water Resources Research Inst., Baton Rouge.
For primary bibliographic entry see Field 05D.
W74-03337

THE EFFECTS OF SURFACE IRRIGATION WITH DAIRY MANURE SLURRIES ON THE QUALITY OF GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
J. C. Barker.
Available from the National Technical Information Service as PB-226 917, $8.75 in paper copy, $1.45 in microfiche. Ph.D. Thesis, June 1973. 99 p, 12 fig, 10 tab, 52 ref, 2 append. OWRR A-021-TENN (2). 14-31-0001-3243.

Descriptors: *Water quality, Agriculture, *Irrigation, Nitrates, Groundwater, *Farm wastes, Feedlots, *Tennessee, Land use, Water pollution sources, Lagoons, Infiltration, Water reuse, Recycling.
Identifiers: *Dairy waste management, *Slurry irrigation, Hydraulic transport (Wastes), Manure pumps.

An experimental manure slurry irrigation system was established at the University of Tennessee, Knoxville Cherokee Dairy to receive in a large holding tank, the rainfall runoff, wastewater, and most of the manure from the 125-cow milking herd. About 5.5 tons of dry manure per acre per month was applied by slurry irrigation to a 4-acre test pasture area with groundwells and runoff collecting facilities. Solids accumulation on the ground presented no problems. The quality of surface runoff samples from the test area varied greatly with runoff volume; however, the parameter concentrations were usually within those specified by the Federal Water Pollution Control Administration for raw surface water sources for public supplies. Manure slurry apparently infiltrated into the shallow groundwater on the downgrade side of the manure-saturated area. The system performed satisfactorily and has been durable. Optimum performance of the system requires careful management to continuously maintain storage capacity for lot runoff while controlling surface runoff of irrigated slurry. The slurry irrigation system offers possibilities for improved efficiency in dairy manure management while creating a minimum of pollution problems. (See also W72-07818) (Sewell-Tennessee)
W74-03339

EFFECTS OF PARTICLE SIZE AND WAVE STATE ON GRAIN DISPERSION,
Chicago Univ., Ill. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 02L.
W74-03344

PRELIMINARY REPORT ON THE HYDROGRAPHY OF THE PENSACOLA BAY ESTUARY, FLORIDA,
Florida Dept. of Natural Resources, St. Petersburg. Marine Research Lab.
For primary bibliographic entry see Field 02L.
W74-03347

MATHEMATICAL SIMULATION OF TIDAL TIME-AVERAGES OF SALINITY AND VELOCITY PROFILES IN ESTUARIES,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 02L.
W74-03348

HAZARDS OF WASTE DISPOSAL IN GROUNDWATER BASINS,
Geological Survey, Sacramento, Calif.
For primary bibliographic entry see Field 05E.
W74-03357

REMOTE SENSING IN THE STUDY OF COASTAL PROCESSES,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 07B.
W74-03373

POTENTIAL OF AN ERODING URBAN SOIL FOR THE PHOSPHORUS ENRICHMENT OF STREAMS: I. EVALUATION OF METHODS,
Massey Univ., Palmerston North (New Zealand).
J. C. Ryden, J. K. Syers, and R. F. Harris.
J Environ Qual. Vol 1, No 4, p 430-434, 1972. Illus.
Identifiers: Desorption, *Fertilizers, Methods, *Phosphorus, *Soil erosion, Sorption, Streams, *Urban development.

Eroding non-calcareous and calcareous soil horizons sampled on an urban development site sorbed a varying proportion of added inorganic phosphate (P). At an added P level of 600 micrograms P/l (30 micrograms P/g soil in 50 ml of 0.1 M NaCl), the Al horizon showed a net release of P whereas the B1 and 3Cl horizons sorbed 96 and 53% of the added P, respectively. The appreciable release of P from the Al horizon is attributed to the presence of a small amount of a moderately soluble P fertilizer-soil reaction product. In simulated stream systems employing a solution/soil ratio of 1000:1, initial added P concentrations of 0 and 50 micrograms P/l, and adequate aeration, approximately 50% of the final P concentration was attained in less than 3 hr. Release of P (50 micrograms P/1) from the Al horizon was independent of the initial P concentration. The B1 horizon released 10 micrograms P/1, twice that released by the 3Cl horizon, whereas these 2 horizons sorbed approximately equal amounts of added P. In a system containing a 1:1 mixture of the Al and Bl horizons, the amount of P released by the Al in the presence or absence of added P was greater than that capable of being sorbed by the Bl horizon. Initial P concentrations were shown to be more important than the solution/soil ratio in determining the extent of uptake and release of P by the soil horizons. The use of a 400:1 solution/soil ratio and low levels of added P (0-200 micrograms P/1) provides a useful basis for developing a routine test for evaluating the potential of eroding soils for the P enrichment of streams.--Copyright 1973, Biological Abstracts, Inc.
W74-03438

WATER MOVEMENTS IN SHALLOW COASTAL BAYS AND ESTUARIES,
Miami Univ., Fla. Sea Grant Institutional Program.
For primary bibliographic entry see Field 02L.
W74-03442

EFFECT OF PHOSPHATE AND CHLORIDE SALTS ON AMMONIFICATION IN WATERLOGGED SOILS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-03445

ORGANIC COMPOUNDS IN SOIL WATER OF SOME ULTISOLS OF THE ATLANTIC COASTAL PLAIN,
North Carolina State Univ., Raleigh. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W74-03494

DISTRIBUTION AND CHARACTERISTICS OF ORGANIC MATTER IN RIVER WATERS OF THE TUNDRA ZONE (RASPREDELENIYE I OSOBENNOSTI ORGANICHESKIKH VESHCHESTV RECHNYKH VOD TUNDROVOY ZONY),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
For primary bibliographic entry see Field 02K.
W74-03534

TECHNIQUES IN FORECASTING CONTENT OF ORGANIC AND BIOGENIC SUBSTANCES IN WATER OF EXISTING AND PROPOSED WATER BODIES (K METODIKE PROGNOZIROVANIYA SODERZHANIYA ORGANICHESKIKH I BIOGENNYKH VESHCHESTV V VODE SUSHCHESTVUYUSHCHIKH I PROYEKTIR UYEMYKH VODOYEMOV),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 02H.
W74-03535

MATHEMATICAL MODELING OF EUTROPHICATION OF LARGE LAKES,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program.
For primary bibliographic entry see Field 05C.
W74-03537

NITRATE AND NITRITE IN THE SURFACE WATERS OF TWO DELAWARE SALT MARSHES,
Delaware Univ., Newark. Dept. of Biological Sciences.
D. Aurand, and F. C. Daiber.
Chesapeake Science, Vol 14, No 2, p 106-111, 1973. 4 fig, 16 ref.

Descriptors: *Nitrates, *Nitrites, *Salt marshes, *Delaware, Salinity, Tidal effects, Productivity, Nitrification, Aquatic plants, Ditches, Nutrients, Estuaries, Nitrogen, Phosphorus, Dikes.
Identifiers: *Delaware Bay, Murderkill Marsh (Dela.), Canary Creek Marsh (Dela.), Macrophytes.

Data concerning nitrogen compounds in salt marsh waters are important in view of the critical role of the salt marsh in estuarine and coastal ecosystems. Distribution of nitrate and nitrite in two Delaware salt marshes was studied from July 1966 through December 1967. Canary Creek Marsh, located near the mouth of Delaware Bay, was characterized by high salinity, low nitrate water. The Murderkill Marsh, in central Delaware, was characterized by low salinity, high nitrate water. Man-made control structures in the Murderkill Marsh inhibited free tidal exchange and modified the distribution of nitrate and nitrite. The following parameters were measured at each station: nitrate, nitrite, pH, salinity, water temperature, air temperature, and weather. The tendency was for salinity stabilization and lack of exchange with increasing level of control, culminating in the high level impoundment situation. Interesting patterns in the tidal distribution of nitrate were seen in both areas. In Murderkill River, the seasonal pattern was similar, but with only a short summer period of low nitrate levels. This study suggests that ditching and control structures in marshland areas can have inhibitory effects on the nutrient exchange with the estuarine community. (Jones-Wisconsin)
W74-03538

HEAVY METALS IN THE SEDIMENTS OF THE DANUBE, EMS, WESER AND ELBE RIVERS IN WEST GERMANY, (IN GERMAN),
Heidelberg Univ. (West Germany). Laboratorium fuer Sedimentforschung.
K. Banat, U. Foerstner, and G. Mueller.
Naturwissenschaften. Vol 59, No 12, p 525-528, 1972. Illus. (English summary).
Identifiers: Cadium, Danube River, Elbe River, Ems River, *Heavy metals, Lead, Mercury, Rivers, *Sediments (Clay), Weser, *West Germany.

The pollution with heavy metals of the clay fraction of sediments in major rivers in the Federal Republic of Germany was investigated. Compared to the average contents in argillaceous sedimentary rocks, the elements Cd, Hg, and Pb, which are known to possess high toxicity, were found to be enriched by a factor of up to 300, 50 and 30, respectively.--Copyright 1973, Biological Abstracts, Inc.
W74-03552

ANALYSIS OF TRACE ORGANIC COMPOUNDS IN NEW ENGLAND RIVERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05A.
W74-03553

REGRESSIONS BETWEEN BIOLOGICAL OCEANOGRAPHIC MEASUREMENTS IN THE EASTERN TROPICAL PACIFIC AND THEIR SIGNIFICANCE TO ECOLOGICAL EFFICIENCY,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
M. Blackburn.
Limnology and Oceanography, Vol 18, No 4, p 552-563, July 1973. 1 fig, 3 tab, 10 ref.

Descriptors: *Pacific Ocean, *Standing crops, *Primary productivity, *Regression analysis, *Biological properties, Tropical regions, Zooplankton, Temporal distribution, Spatial distribution, Latitudinal studies, Ecological distribution, Statistical methods, Chlorophyll, Seasonal, Organic matter, Trophic level, Crustaceans, Nekton, Measurement, Oceanography.
Identifiers: Chlorophyll a, Regression coefficients, Marine environment.

Simple regressions of various standing stocks on each other and on primary productivity were compared by covariance analysis for different seasons, latitudes, and longitudes in the eastern tropical Pacific. The stock of zooplankton varies significantly with that of chlorophyll a to a power less than 1.0 in all seasons and areas, and it is shown that a similar relation probably exists between the corresponding rates of daily production. A similar relation holds in the regression of standing stock of fish-cephalopod micronekton, suitably lagged, on stock of zooplankton. Thus the relative amount of organic matter transferred from one trophic level to another probably decreases with an increase of stock and production at the lower level, so that ecological efficiency is higher in oligotrophic than in eutrophic situations, in tropical oceans. Standing stock of chlorophyll a varies significantly with primary productivity to a power less than 1.0. The stock of crustacean micronekton sometimes varies with the stock of chlorophyll a to a power greater than 1.0, which is interpreted as a feeding aggregation. (Holoman-Battelle)
W74-03559

A STUDY OF PLANKTON DYNAMICS AND NUTRIENT CYCLING IN THE CENTRAL GYRE OF THE NORTH PACIFIC OCEAN,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
R. W. Eppley, E. H. Renger, E. L. Venrick, and M. M. Mullin.
Limnology and Oceanography, Vol 18, No 4, p 534-551, July 1973. 5 fig, 6 tab, 73 ref.

Descriptors: *Cycling nutrients, *Zooplankton, *Phytoplankton, *Growth rates, Limiting factors, *Pacific Ocean, *Photosynthesis, *Mixolimnion, Phosphates, Nitrogen, Biomass, Water pollution, Water analysis, Vitamins, Trace elements, Carbon, Nutrients, Nitrates, Plant growth, Water pollution, Methodology, Water temperature, Salinity, Sea water, Chemical analysis, Primary productivity, Chlorphyll, Organic matter, Fluorometry.
Identifiers: Excretion rates, Assimilation rates, Data interpretation, Chemical composition, Excretion, Ammonium, Particulate matter, Pheopigments, Chlorophyll a, Adenosine triphosphate, N-15, N-14, Enrichment, Trichodesmium, Oscillatoria.

The dynamics of phytoplankton growth in relation to nutrient concentrations were studied in the subtropical central gyre of the North Pacific in November 1971. Rates of excretion of phosphate, ammonium, and urea-N by zooplankton and rates of assimilation of carbon, nitrate, ammonium, and urea-N by phytoplankton were measured. The growth rate of phytoplankton was estimated to be about 0.2-0.3 doublings/day in the 70-80-m mixed layer, apparently limited by concentrations of both nitrogen and phosphate. Only nitrogen concentration was so limiting at a station near the western edge of the California Current. No diel changes in concentrations of ambient nutrients were observed. Urea-nitrogen appears to be an important source of nitrogen for phytoplankton growth in these waters and to be an important excretory product of zooplankton. Concentrations of phosphate and ammonium were extremely low, but turnover times were estimated to be of the order 3-5 days for ammonium and greater than 10 days for urea and phosphate. Biomass of phytoplankton in the mixed layer was also very low, and corresponded approximately to that expected if a laboratory culture were operated as a nitrogen-limited chemostat with a concentration of about 0.48 microgram-atom N/liter in the incoming culture medium and a dilution rate of about 0.13 per day. Physiological differences were noted between the phytoplankton in the mixed layer and that living below the thermocline, as were differences in chemical composition (ratio of C:Chl a and C:N). (Holoman-Battelle)
W74-03561

OBSERVATIONS ON THE ECOLOGY AND DISTRIBUTION OF THE TURBELLARIAN FAUNA OF THE DANUBE DELTA (BEOBACHTUNGEN UBER DIE OKOLOGIE UND VERBREITUNG DER TURBELLARIENFAUNA IM DONAU-DELTA),
Bucharest Univ. (Romania). Faculty of Biology.
For primary bibliographic entry see Field 05C.
W74-03574

PHOTODECOMPOSITION OF P--CHLOROPHENOXYACETIC ACID,
California Univ., Davis. Dept. of Environmental Toxicology.
D. G. Crosby, and A. S. Wong.
Journal of Agricultural and Food Chemistry, Vol 21, No 6, p 1049-1052, November/December 1973. 4 fig, 16 ref.

Descriptors: *Ultraviolet radiation, *Aqueous solutions, Chemical degradation, Light, Sodium compounds, Pesticides, Water pollution effects, Chemical reactions.
Identifiers: *Photodecomposition, *Chlorophenoxyacetic acid, Sunlight, Polymerization, Sodium salt, Chlorinated phenoxyacetic acids, Photolysis, Fate of pollutants.

The purpose was to examine the effect of natural and simulated sunlight (300-450 nm) on dilute aqueous 4-CPA solutions and establish a general mechanism for the environmental photolysis of phenoxy acids. Solutions of 4-CPA (p-chlorophenoxyacetic acid) decomposed readily under sunlight or laboratory ultraviolet light to provide principally p-chlorophenol, phenol, hydroquinone, p-chlorophenyl formate, phenoxyacetic acid, p-hydroxyphenoxyacetic acid, and humic acids. These products represent oxidative removal of the side chain, replacement of the clorine by hydroxyl or by hydrogen, and polymerization of unstable intermediates. Formation of p-chlorobenzonitrile by irradiation of 4-CPA in the presence of cyanide ions substantiated that the corresponding replacement of the ring chlorine by hydroxyl was a photonucleophilic reaction. (Mortland-Battelle)
W74-03583

PHOTODECOMPOSITION OF 2,4,5--TRICHLOROPHENOXYACETIC ACID (2,4,5--T) IN WATER,
California Univ., Davis. Dept. of Environmental Toxicology.
D. G. Crosby, and A. S. Wong.
Journal of Agricultural and Food Chemistry, Vol 21, No 6, p 1052-1054, November/December 1973. 3 fig, 2 tab, 15 ref.

Descriptors: *2 4 5-T, *Degradation (Decomposition), *Pollutant identification, Water pollution effects, Aqueous solutions, Ultraviolet radiation, Irradiation, Chromatography, 2 4-D, Light, Chemical reactions.
Identifiers: *Photodecomposition, Acetone, Riboflavin, Sunlight, Fate of pollutions, Photolysis, 4-CPA.

Photodecomposition of the herbicide 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) in aqueous solution principally involved cleavage of the ether bond and replacement of the ring chlorines by hydroxyl and by hydrogen. The major products were 2,4,5-trichlorophenol and 2-hydroxy-4,4-dichlorophenoxyacetic acid; 4,6-dichlororesorcinol, 4-chlororesorcinol, 2,5-dichlorophenol, and a dark polymeric product also were isolated. The toxic 2,3,7,8,-tetrachlorodibenzo-p-dioxin was not detected among the photodecomposition products. 2,4,5,-T photolyzed very slowly compared to its 4-chloro and 2,4-dichloro analogs, but the 11-fold increase in photolysis rate caused by sensitization with acetone or riboflavin suggests that sunlight can be an important factor in the environmental degradation of 2,4,5-T. (Mortland-Battelle)
W74-03585

GRAZING OF PSEUDOCALANUS MINUTUS ON NATURALLY OCCURING PARTICULATE MATTER,
Dartmouth (Nova Scotia). Bedford Inst.
S. A. Poulet.
Limnology and Oceanography, Vol 18, No 4, p 564-573, July 1973. 5 fig, 1 tab, 13 ref.

Descriptors: Grazing, *Food habits, *Laboratory tests, Particle size, Selectivity, Browse utilization, Copepods, Organic matter, Water sampling, Plankton nets, Crustaceans, Invertebrates, Marine animals, Food chains, Sea water, Cymnodinium.
Identifiers: *Particulate matter, *Pseudocalanus minutus, Bedford Basin, Vertical distribution, Particle concentration, Flagellates, Thalassiosira, Chaetoceros, Food sources, Marine environment.

The quantity and size of particulate matter consumed by Pseudocalanus minutus were studied in seawater samples collected from different depths and from closely spaced stations. The heterogeneity in particle distribution resulted from quantitative and qualitative fluctuations in the particle spectrum, although at times the total concentration was about the same. Pseudocalanus minutus consumed particles between 4 and 100 microns. An electivity index value was more often positive for 25.4-57.0-micron particles. On the average, particles less than 39 microns were more readily eaten than larger particles. The consumption by copepods at different locations was related not only to particle size spectrum. Pseudocalanus was able to shift its grazing pressure from small to large particles to compensate for a reduction in density of small particles. (Holoman-Battelle)
W74-03593

DISTRIBUTION OF FORAMINIFERA NEAR POLLUTION SOURCES IN CHALEUR BAY,
Bedford Inst., Dartmouth (Nova Scotia).
C. T. Schafer.
Water, Air, and Soil Pollution, Vol 2, No 2, p 219-233, June 1973. 2 fig, 5 tab, 48 ref.

Descriptors: *Estuaries, *Distribution patterns, *Water pollution effects, Protozoa, Sewage, Industrial wastes, Sediments, Hydrogen ion concentration, Water temperature, Salinity, Oxygen, Lead, Zinc, Fertilizers, Chlorine, Alkalis (Bases), Powerplants, Pulp wastes, Benthic fauna, Canada, Competition, Dominant organisms, Water quality, Seasonal.
Identifiers: *Foraminifera, Species diversity.

Benthonic foraminifera samples were collected seasonally near several isolated sources of sewage and (or) industrial effluent in the Restigouche estuary. Distinct biotopes based on species diver-

sity and population density are developed locally especially near Dalhousie peninsula and Belledune Point in response to the effects of effluent discharge. Averaged diversity indices calculated in known polluted areas describe in initially depressed curve that reflects the development of near-abiotic conditions close to the effluent source and, at some distance offshore, an anomalously high diversity which may be indicative of a zone near each outfall in which certain components of the effluent generate a temporary favorable artificial environment. The Elphidium incertum/clavatum group usually dominates the living fauna near sewage outfalls and appears to be able to invade and maintain itself on nearshore sediment substrates which have pH values in excess of 6.4. (Mortland-Battelle)
W74-03596

DISSIMILATORY REDUCTION OF INORGANIC SULFUR BY FACULTATIVELY ANAEROBIC MARINE BACTERIA,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05C.
W74-03597

GLUCOSE AND PYRUVATE METABOLISM OF SPIROCHAETA LITORALIS, AN ANAEROBIC MARINE SPIROCHETE,
Massachusetts Univ., Amherst. Dept. of Microbiology.
R. B. Hespell, and E. Canale-Parola.
Journal of Bacteriology, Vol 116, No 2, p 931-937, November 1973. 3 fig, 6 tab, 29 ref.

Descriptors: *Metabolism, *Anaerobic bacteria, Marine bacteria, Cytological studies, Sodium chloride, Fermentation, Carbon dioxide, Radioactivity techniques, Enzymes, Chemical reactions, Reduction (Chemical), Hydrolysis, Phosphates, Cultures, Salts.
Identifiers: *Spirochaeta litoralis, *Glucose, *Pyruvates, Spirochetes, Acetates, Dissimilation, Lysis, Rubredoxin, Buffers, Culture media.

The pathways of glucose and pyruvate metabolism in Spirochaeta litoralis, a free-living, strictly anaerobic marine spirochete, were studied. Addition of 0.2 to 0.4 M NaCl (final concentration) to suspending buffers prevented cell lysis and was necessary for gas evolution from various substrates by cell suspensions. The organism fermented glucose mainly to ethanol, acetate, C02, and H2. Determination of radioactivity in products formed from C-14-labeled glucose and assays of enzymatic activities in cell extracts indicated that S. litoralis catabolized glucose via the Embden-Meyerhof pathway. A clostridial-type clastic reaction was utilized by the spirochete to degrade pyruvate to acetyl-coenzyme A, C02, and H2. Formation of acetate from acetyl-coenzyme A was catalyzed by phosphotransacetylase and acetate kinase. Nicotinamide adenine dinucleotide-dependent acetaldehyde and alcohol dehydrogenases converted acetyl-coenzyme A to ethanol. A reversible hydrogenase activity was detected in cell extracts. S. litoralis cell extracts contained a rubredoxin similar in spectral properties to other bacterial rubredoxins. (Mortland-Battelle)
W74-03600

METHYLMERCURY IN ESTUARINE SEDIMENTS,
Florida State Univ., Tallahassee. Dept. of Oceanography.
A. W. Andren, and R. C. Harriss.
Nature, Vol 245, No 5423, p 256-257, October 5, 1973. 2 fig, 1 tab, 12 ref.

Descriptors: *Mercury, 8sediments, *Estuaries, Water pollution effects, Gulf of Mexico, Gas chromatography, Distribution patterns, Organic compounds, Fluorescence, Chemical reactions, Biochemistry.
Identifiers: *Methylmercury, Mississippi Delta, Mobile Bay, Everglades, Sample preservation, Flameless atomic fluorescence, Methylation.

A study was conducted to determine the concentration and distribution of methylmercury compounds in natural sediments from polluted and unpolluted coastal environments. Surface sediments were collected and analyzed from the Mississippi Delta, Mobile Bay, and the Florida Everglades. All the sediment samples were frozen immediately after collection and returned to the laboratory for the determination of total mercury, methylated mercury and total organic content. The methylmercury concentration varied from less than 0.02 ng/g to 0.19 ng/g, the high value being in the estuarine sediments from Mobile Bay. The most interesting aspect of the data is the fact that the methylmercury content never represents more than 0.07 percent of the total mercury present; the average is 0.03 percent. Measurements of methylmercury with depth in two cores from Mobile Bay were also made. Both cores were reducing except for the upper 4 to 5 cm. It is shown that the methylmercury values decrease with depth to minima of approximately 0.02 ng/g and that the methylmercury concentrations vary from 0.04 percent to 0.006 percent of the total mercury. The results suggest that future toxicological studies should emphasize biochemical mechanisms for synthesis of methylmercury from inorganic mercury species. (Mortland-Battelle)
W74-03602

MERCURY-SELENIUM CORRELATIONS IN MARINE MAMMALS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Toxicology.
For primary bibliographic entry see Field 05C.
W74-03603

DETERGENT AND NON-DETERGENT PHOSPHORUS IN SEWAGE,
Utah Water Research Lab., Logan.
D. B. Porcella, P. A. Cowan, and E. J. Middlebrooks.
Public Works, Vol 104, No 9, p 126-128, September 1973. 1 fig, 2 tab, 6 ref.

Descriptors: *Domestic wastes, *Detergents, *Phosphates, *Water quality control, *Nutrient removal, *Sewage effluents, Water pollution sources, Organic matter, Carbon, Nitrogen, Iron, Biochemical oxygen demand, Hydrogen ion concentration, Alkalinity, Conductivity, Flow rates, Suspended solids.
Identifiers: Characterization, Volatile solids, Background levels.

Sewage samples were collected from a suburban community of the City of Logan, Utah, and analyzed to develop basic data on the changes in phosphorus content that might occur as a result of restricting the use of heavy-duty detergents. A baseline sample was collected first, and three weeks later the residents were requested not to use dishwashers and clotheswashers for a period of 48 hours to permit collection of test samples. Flow rates, C, N, P, Fe, BOD, pH, alkalinity, conductivity, suspended solids, and volatile solids were measured for the samples collected during the two periods. During the test period, total phosphorus decreased by 57 percent. The concentration of organic carbon and BOD almost doubled in the test sample while nitrogen remained approximately constant. Iron was relatively low in the raw sewage. Alkalinity, pH, and conductivity were in the range considered normal for raw sewage. The difference in solids concentration corresponds to the increase in organic carbon and BOD indicating that the lack of dilution water from the washers caused a significant increase in concentration in the test sample. It is concluded that additional research is necessary before decisions are made to restrict detergent usage or to remove phosphorus at treatment plants. (Little-Battelle)
W74-03606

HYDRAULIC MODEL TESTS OF ESTUARIAL WASTE DISPERSION,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
R. L. O'Connell, and C. M. Walter.
Journal of the Sanitary Engineering Division, American Society of Civil Engineers, Vol 89, No SA1, Proceedings Paper 3394, p 51-65, January 1963. 4 fig, 1 tab, 12 ref.

Descriptors: *California, Bays, *Estuaries, *Paths of pollutants, *Waste disposal, *Dye dispersion, Salinity, Barriers, Water quality, *Hydraulic models, Coasts, Outlets, Biochemical oxygen demand.
Identifiers: San Francisco Bay.

Hydraulic model studies were made of the waste dispersion characteristics of San Francisco Bay. The effects of several proposed salinity control barriers on these characteristics were investigated. A fluorescent dye tracer, Pontacyl Brilliant Pink 'B' and the G. K. Turner Associates Fluorometer were used. Using the results of the model studies, estimates were made of the effect of existing and future waste loads on the oxygen resources of the Bay. When applied to existing waste loads, the calculated general description of dissolved oxygen levels agreed favorably with observed conditions. The test procedures provide a suitable basis for estimating the effect of proposed changes in the Bay system on water quality and for determining the associated treatment and disposal practices necessary to meet desired water quality objectives. The use of the hydraulic model results in a significant saving of both time and expense. (Sinha - OEIS)
W74-03622

NEAR-SHORE CIRCULATION IN THE CALIFORNIA CURRENT,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02L.
W74-03624

PREDICTED FLUSHING TIMES AND POLLUTION DISTRIBUTION IN THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
V. T. Neal.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 2, Part 4, Chap 82, p 1463-1480, 1967. 7 fig, 2 tab, 8 ref.

Descriptors: *Columbia River, *Oregon, *Estuaries, Pollution, Salinity, River flow, Diffusion, Water pollution, Coasts, Distribution, Saline water intrusion, *Path of pollutants.
Identifiers: Outfalls, Tidal prism, *Flushing.

The observed salinity distribution in the Columbia River Estuary is used to predict the flushing times for various river discharge rates, varying tidal ranges, and varying salinity intrusions. Both the modified tidal prism method and the fraction of freshwater method are used, and the results are compared. The latter method predicts shorter flushing times, while both methods vary in a similar manner with changing river discharge and changing salinity intrusion. Both methods predict a relatively short flushing time for the estuary. The observed salinity distributions under varying conditions are also used to predict the distribution of conservative and nonconservative pollutants. In this case the fraction of fresh water method and the diffusion equation are used. In general, the fraction of fresh water method predicts higher concentrations. When the lower estuary is divided into two channels, the two methods give quite dif-

ferent results. The diffusion equation method predicts a peak concentration upstream from the outfall rather than at the outfall, when the outfall location is arbitrarily placed at certain locations. (See also W74-03699) (Sinha-OEIS)
W74-03704

PRELIMINARY RESULTS AND COMPARISON OF DYE TRACER STUDIES CONDUCTED IN HARBORS, ESTUARIES, AND COASTAL WATERS,
Naval Oceanographic Office, Washington, D.C.
L. J. Fisher.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 2, Part 4, Chap 83, p 1481-1492, 1967. 5 fig, 2 tab, 8 ref.

Descriptors: Harbors, *Estuaries, Coasts, *Pollutants, Spatial distribution, Temporal distribution, *Tracers, *Path of pollutants, *Dye releases.
Identifiers: Flushing.

Dye tracer studies have been conducted by the Naval Oceanographic Office in harbors, estuaries, and coastal waters during the past seven years. A brief description of the tracers, equipment, and sampling techniques used, and a discussion of some of the results are presented. Dye tracer techniques are effective for estimating the flushing time and describing the temporal and spatial distribution of a contaminant in a specific area for the environmental conditions existing at the time of the study. The relationships concerning the maximum dye concentration indicate the possibility of developing a simple method for predicting: (1) the decrease in maximum concentration of any type or amount of contaminant released in the study areas during any environmental conditions and (2) the decrease in maximum concentration of a contaminant in other similar areas where tracer studies are not feasible. (See also W74-03699) (Sinha-OEIS)
W74-03705

5C. Effects of Pollution

PARABIOTIC GROWTH CHARACTERISTICS OF SELECTED SEWAGE BACTERIA,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
E. L. Fincher.
Available from the National Technical Information Service as PB-226 769; $5.25 in paper copy, $1.45 in microfiche. Project Completion Report ERC-0973, July 1973. 168 p, 56 fig, 76 tab, 20 ref.

Descriptors: *Aerobic bacteria, Coliforms, *Sewage bacteria, *Growth rates, Water pollution effects, Water pollution sources.
Identifiers: *Heterotrophic bacteria, Mixed bacterial flora, *Bacterial interactions, Taxonomic analysis, *Parabiotic growth apparatus, *Mesophilic bacteria.

Experimental techniques were developed for use in determining the qualitative changes in the aerobic heterotrophic bacterial populations in raw domestic sewage. Mixed bacterial flora are subject to various ecological pressures such as the availability of metabolizable nutrients. Certain populations may be at a competitive disadvantage because other organisms have a more versitile metabolism which enables preferential utilization of nutritional substrate, alteration of the growth environment through production of metabolic products inhibitory to other organisms, and changes in pH and available oxygen. A raw sewage sample was selected as the model system and held under controlled laboratory conditions. The initial mixed populations emerged into homogeneous populations without overall change in the rate of dissimilation of substrate. The pH decrease seemed to be an important factor in the selection pressure. The study had the important byproduct of developing a system for studying the interaction through chemical exchange among selected bacterial isolates. Measurement of interaction was incorporated in design of a system to monitor changes in cell mass by optical density changes. The system was operated successfully with three growth chambers. (James - Georgia)
W74-03203

SENSITIVITY OF VERTEBRATE EMBRYOS TO HEAVY METALS AS A CRITERION OF WATER QUALITY,
Kentucky Water Resources Inst., Lexington.
W. J. Birge, and J. J. Just.
Available from National Technical Information Service as PB-226 850; $3.00 in paper copy, $1.45 in microfiche. Research Report No 61, 1973. 20 p, 4 fig, 5 tab, 2 ref. OWRR A-035-KY (1). 14-31-0001-3517.

Descriptors: *Bioassay, *Embryonic growth stage, Water quality control, *Heavy metals, Water pollution effects, *Chlorides, *Sodium arsenite, Cadmium, Mercury, Lead, Zinc, Toxicity, Lethal limit, Monitoring, Frogs, Poultry.
Identifiers: Goldfish.

Embryonic and/or larval stages of the leopard frog (Pana pipiens), domestic fowl (Gallus domesticus) and the goldfish (Carassius auratus) were treated with cadmium chloride, mercuric chloride, lead chloride, zinc chloride and sodium arsenite. The principal objectives were (1) to determine the sensitivity of vertebrate embryos to certain metals which are of consequence in water pollution, and (2) to ascertain the suitability of vertebrate embryos as bioassay organisms for monitoring metallic pollutants within water resources. Vertebrate embryos were found to be highly sensitive to the toxic effects of all the metals studied. Concentrations of mercury as low as 10 ppb, with continuous treatment, produced a 100% kill of frog embryos and a significant degree of lethality in chick embryos. Cadmium and lead also produced detectable levels of lethality and/or anomalous development when administered to chick embryos at concentrations of 10 ppb. At 0.5 ppm, mercury and cadmium produced 100% lethality in populations of goldfish embryos treated for four days. Lead and zinc were less toxic to the latter, producing approximately 80% lethality under similar conditions. These results indicate that vertebrate embryos are substantially more sensitive to metallic pollutants than are adult forms, and that they may constitute a valuable tool for monitoring the quality of water resources. (Grieves - Kentucky)
W74-03206

THE INFLUENCES OF AN URBAN AREA AND A RESERVOIR ON BENTHIC MACROINVERTEBRATE PRODUCTION IN THE DES MOINES RIVER, IOWA,
Drake Univ., Des Moines.
J. O. Kennedy.
Available from the National Technical Information Service as PB-227 609; $4.50 in paper copy. M.A. Thesis 1971. 41 p, 8 fig, 4 tab, 34 ref, 6 append.

Descriptors: *Benthos, Invertebrates, Reservoirs, *Iowa, Biomass, *Productivity, *Aquatic insects, Water quality, *Cities.
Identifiers: Des Moines River (Ia), *Trichoptera.

Artificial substrates were used to measure the differences in macroinvertebrates standing biomass, production and turnover ratio at four stations in the Des Moines River from April, 1970 to March, 1971. The location of each station was chosen to demonstrate the effects of an urban area or an impoundment on the productivity of that area. Results showed that members of the insect order Trichoptera were the most abundant organisms collected and that they contributed most to production. Standing biomass and production values were greatest above the proposed Saylorville Dam and below Red Rock Dam. Reduced values for production were found above the urban area, the lowest value below the urban area. (See also W74-03210 and W74-03211)
W74-03209

ANALYSIS OF THE BENTHIC MACROINVERTEBRATE COMMUNITY STRUCTURE FOR ASSESSMENT OF WATER QUALITY OF DES MOINES RIVER,
Drake Univ., Des Moines, Iowa.
R. L. Westphal.
Available from the National Technical Information Service as PB-226 785; $5.00 in paper copy, $1.45 in microfiche. M.A. Thesis 1973. 49 p, 1 fig, 13 tab, 54 ref.

Descriptors: *Water quality, *Iowa, *Invertebrates, Benthos, *Aquatic insects, Urbanization, Cities, Sampling.
Identifiers: Des Moines River (Ia), *Trichoptera, Substrates.

Artificial substrates were used to measure differences in macroinvertebrate species diversity at five stations in the Des Moines River in the metropolitan area of Des Moines to assess water quality. Results showed that members of the insect order Trichoptera were the most abundant organisms collected. An analysis of variance for standardized distance (S.D.) values demonstrated significant difference for sampling dates and location of stations. However, when corrected for current velocity, no significant difference was detected for location of stations, but significance over time was retained. (See also W74-03209 and W74-03211)
W74-03210

SPECIES DIVERSITY OF BENTHIC MACROINVERTEBRATES IN THE DES MOINES RIVER, IOWA,
Drake Univ., Des Moines, Iowa.
D. B. Oestmann.
Available from the National Technical Information Service as PB-226 775; $4.00 in paper copy, $1.45 in microfiche. M.A. Thesis, 1973. 31 p, 1 fig, 8 tab, 42 ref.

Descriptors: *Benthos, Invertebrates, *Iowa, *Cities, *Reservoirs, Sampling, *Biological communities.
Identifiers: *Species diversity, Des Moines River (Ia), Substrates.

The biotic community structure of the Des Moines River was assessed in several locations as influenced by a reservoir and a large metropolitan area. Artificial substrate samplers were used as the collecting device and species diversity indices were used for statistical comparison of the communities at various sites in the river. Results showed a significant difference existed between the station above the metropolitan area (station 2) and the station below the metropolitan area (station 3). The community farthest from a 'biological desert' condition was the one immediately below the metropolitan area (station 3). (See also W74-03209 and W74-03210)
W74-03211

SHORT-TERM EFFECT OF INJECTION OF TERTIARY-TREATED SEWAGE ON IRON CONCENTRATION OF WATER IN MAGOTHY AQUIFER, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
S. E. Ragone, J. Vecchioli, and H. F. H. Ku.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 273-290, 1973. 3 fig, 4 tab, 23 ref.

Descriptors: *Artificial recharge, *Reclaimed water, *Injection wells, *Water pollution effects,

*Iron, Pyrite, Waste disposal wells, Path of pollutants, Hydrogen ion concentration, Tertiary treatment, *New York.
Identifiers: Long Island (NY).

Tertiary-treated sewage (reclaimed water) is recharged by a deep well into the Magothy aquifer, the primary water-supply source for Nassau County, Long Island, New York. As of September 1972, 12 recharge tests have been run since the inception of the recharge program in September 1968. Although the iron concentrations of reclaimed and native water averaged 0.44 mg/liter and 0.24 mg/liter, respectively, the iron concentration of the mixed native and reclaimed water at times exceeded 3 mg/liter. The most probable source of iron is the pyrite in the Magothy aquifer. During recharge, the natural reducing condition in the aquifer is replaced by a progressively more oxidizing environment. The initial response to this change is the oxidation of pyrite, which releases Fe into solution. Eventually, ferric hydroxide precipitates, and the Fe concentration decreases. The oxidation mechanism involves inorganic and organic constituents in the reclaimed water. (See also W74-03222) (Knapp-USGS)
W74-03232

BOTTOM MACROFAUNA IN THE GOCZALKOWICE DAM RESERVOIR IN THE YEARS 1965-1969,
Polish Academy of Sciences, Pszczyna. Hydrobiological Station.
E. Krzyzanek.
Acta Hydrobiologica. Cracow, Vol 15, No 2, p 189-196, 1973. 1 fig, 1 tab, 15 ref.

Descriptors: *Benthic fauna, *Reservoirs, *Systematics, *Speciation, Aquatic animals, Aquatic insects, Mollusks, Annelids, Dominant organisms, Nematodes, Crustaceans, Bottom sampling, Oligochaetes, Invertebrates, Water temperature, Hydrogen ion concentration, Aquatic plants, Midges, Diptera, Snails, Tubificids, Caddisflies, Mayflies, Isopods.
Identifiers: *Macroinvertebrates, *Poland, Myriophyllum verticillatum, Elodea canadensis, Rorippa amphibia, Armoracia lapathifolia, Unio pictorum, Chironomus plumosus, Procladius, Chironomids, Nais, Orb snails, Pond snails, Biting midges, Leeches, Caenis moesta, Alderflies, Sialis, Asellus aquaticus, Tubifex tubifex, Limnodrilus hoffmeisteri, Anodonta cygnea, Pisidium amnicum, Pisidium subtruncatum, Pisidium henslovanum, Valvata naticina, Valvata piscinalis, Valvata piscinalis f. antiqua, Valvata pulchella, Radix limosa.

Investigations of the bottom macrofauna of the dam reservoir at Goczalkowice were carried out from 1965-1969 as a continuation of those carried out from the beginning of its existence. Samples were taken at permanent points situated in 4 zones of the reservoir for analysis. The temperature of the water was 10 and 25 C, the pH value being 7.5-8.0. In the years 1965-1967 a further decrease in the amount of bottom macrofauna was observed, but from 1968 there was a gradual increase. Oligochaeta and the larvae of Chironomidae (mainly Procladius and Chironomus plumosus) dominated quantitatively. The number of large Mollusca, mainly Unio pictorum, also increased. The upper and central zones were most numerously populated by the bottom macrofauna. Usually the encountered forms had already been noted in previous years. (Holoman-Battelle)
W74-03271

CUMULATION OF RADIOACTIVE SUBSTANCE IN DAM RESERVOIRS,
Instytut Gospodarki Kommunalnej, Chorzow (Poland). Samodzielna Pracowniz Radioekologii.
For primary bibliographic entry see Field 05B.
W74-03272

FIELD STUDIES ON PHOTOSYNTHESIS OF CLADOPHORA GLOMERATA (CHLOROPHYTA) IN GREEN BAY, LAKE MICHIGAN,
Wisconsin Univ., Madison. Dept. of Botany.
M. S. Adams, and W. Stone.
Ecology, Vol 54, No 4, p 853-862, Summer 1973. 4 fig, 1 tab, 30 ref.

Descriptors: *Photosynthesis, *Chlorophyta, *On-site data collections, Environmental effects, *Water pollution effects, Aquatic algae, Chemical analysis, Plant tissues, *Lake Michigan, Primary productivity, Water temperature, Nitrogen, Calcium, Strontium, Sodium, Zinc, Heavy metals, Alkali metals, Alkaline earth metals, Hydrogen ion concentration, Alkalinity, Conductivity, Nitrates, Phosphorus, Copper.
Identifiers: *Cladophora glomerata, Green Bay, Chemical composition, Fox River, Seasonal variation, Photosynthetic rates, Data interpretation, Orthophosphates, Ammonium, Barium.

Net photosynthesis of Cladophora glomerata was measured at three sites in lower Green Bay, Lake Michigan, from late spring through summer, 1971. Lower levels of productivity occurred early in the season at two of the sites, when water temperatures were lowest. At the third site water temperature and productivity varied the least. Contrary to other reports, it was found that Cladophora made relatively efficient use of low illumination. Under statistically similar temperature and irradiance levels, productivity was higher with increasing proximity to the mouth of the Fox River. Nitrogen, calcium, strontium, sodium, and zinc also were highest in concentration in plants receiving the greatest amount of effluents from the Fox River in comparison with the site receiving the least. Site differences in productivity appear to be related to nutrient levels, whereas seasonal differences in productivity are probably most closely related to seasonal temperature differences. (Holoman-Battelle)
W74-03274

AN IN SITU EXAMINATION OF THE GRAZING ACTIVITIES OF NATURAL ZOOPLANKTON COMMUNITIES,
Toronto Univ. (Ontario). Dept. of Zoology.
J. F. Haney.
Archiv fur Hydrobiologie, Vol 72, No 1, p 87-132, June 1973. 21 fig, 6 tab, 93 ref.

Descriptors: Grazing, *Eutrophication, *Zooplankton, *Primary productivity, *Canada, *Feeding rates, *Trophic level, *Oligotrophy, *Bogs, Dominant organisms, Diurnal distribution, Seasonal, Foods, Radioactivity techniques, Waterfleas, On-site tests, On-site investigations, Dissolved oxygen, Depth, Phytoplankton, Suspended solids, Methodology, Statistical methods, Crustaceans, Copepods, Vertical migration, Yeasts, Bacteria, Algae.
Identifiers: Heart Lake, Data interpretation.

In Heart Lake, grazing rates for the water column exceed 100 percent/day in the summer, but become less than 10 percent/day during the winter. The lower vertical boundary of zooplankton filter-feeding is closely defined by a 1 ppm dissolved oxygen isopleth during summer stratification. Grazing rates measured with different food items showed some seasonal differences. The populations of dominant filter-feeding zooplankton species in Heart Lake corresponded with grazing rate maxima and minima recorded during the same period. Daphnia rosea and D. galeata were the most important grazers in Heart Lake, 1969, together accounting for approximately 80 percent of the total annual grazing activity. Several species of zooplankton migrate vertically in Heart Lake, resulting in shifts of grazing to the upper stratum at night. At least some species filter more rapidly at night. Eutrophic Heart Lake and the acid bog lake were very similar, with intense grazing by Cladocera limited vertically to the upper 3 meters. In contrast, copepod domination of the zooplankton and extremely low grazing rates uniformly distributed throughout the water column characterized the oligotrophic lake. A comparison of grazing rates and primary productivity in these three lakes showed (1) high grazing and high primary productivity in Heart Lake (2) high grazing and low primary productivity in the bog lake and (3) low grazing and moderate primary productivity in the oligotrophic lake. Phytoplankton renewal rates in oligotrophic lakes are generally far in excess of zooplankton grazing rates, whereas in eutrophic lakes the two rates are comparable. Grazing rates of zooplankton communities were measured in situ by automatically releasing a small quantity of P-32-labeled cells (yeast, algae, and bacteria) inside a plexiglass grazing chamber in the lake and assaying the zooplankton for radioactivity after 5 min feeding. Studies were conducted in the eutrophic Heart Lake and on two occasions in a deep oligotrophic lake and a shallow acid bog. (Little-Battelle)
W74-03276

NITROGEN FIXATION BY THE UNICELLULAR BLUE-GREEN ALGA APHANOTHECE,
Central Rice Research Inst., Cuttack (India). Dept. of Blue-Green Algae.
P. K. Singh.
Archiv fur Mikrobiologie, Vol 92, No 1, p 59-62, July 10, 1973. 4 fig, 12 ref.

Descriptors: *Nitrates, *Bioassay, *Nutrient requirements, *Nitrogen fixation, *Cyanophyta, Cultures.
Identifiers: *Aphanothece, *India, Culture media, Plectonema, Anacystis, Substrate utilization.

The alga Aphanothece sp., which grows vigorously in rice fields of the Central Rice Research Institute, India, was isolated for use in determining rates of nitrogen fixation in media free of combined nitrogen. Nitrogen fixation was estimated by the micro-Kjeldahl technique. Cells were counted using a haemocytometer. The alga grew well both in media containing nitrate and in media lacking nitrate. Little lag occurred when cells grown in medium containing nitrate were transferred to a nitrate-lacking medium, and growth continued for 18-25 days. The generation time for this alga was 12 hr, and more than 2 mg of N were fixed in 25 days. Other algae (Plectonema and Anacystis) from a similar habitat failed to grow in medium lacking nitrate. (Little-Battelle)
W74-03278

TOXICITY OF THE HERBICIDE KURON (SILVEX) TO BLUEGILL EGGS AND FRY,
North Carolina Cooperative Sport Fishery Unit, Raleigh.
R. L. Wilbur, and E. W. Whitney.
Transactions of the American Fisheries Society, Vol 102, No 3, p 630-633, July 1973. 1 tab, 7 ref.

Descriptors: *Pesticide toxicity, *Herbicides, Fish eggs, Fry, *North Carolina, *Water pollution effects, *Bioassay, Fish reproduction, *Sunfishes, Freshwater fish, Chlorinated hydrocarbon pesticides, Lethal limit.
Identifiers: Kuron, *Lepomis macrochirus, Survival, Median tolerance limit.

Experimental treatment with herbicide Kuron of two alligatorweed-infested North Carolina streams was initiated by the U.S. Army Corps of Engineers in summer, 1965. Surveillance of fish and invertebrate populations was provided by the U.S. Bureau of Sport Fisheries and Wildlife. The effects of Kuron on bluegill eggs and fry were examined under laboratory conditions to provide insight on how reproduction of the sunfish family may have been affected by Kuron treatments applied to the streams. Eggs from each of nine bluegills were treated with Kuron concentrations of 0.0 ppm (control), 1.0 ppm, 1.0 ppm, 5.0 ppm, and 10.0 ppm

acid equivalents. Analysis of variance indicated that hatching was not significantly affected by treatments but that survival of fry to an age of 6 days was affected by the treatments. No fry survived at 10.0 ppm and only a token few survived the 5.0 ppm treatment. (Holoman-Battelle)
W74-03279

GERMANIUM INCORPORATION INTO THE SILICA OF DIATOM CELL WALLS,
California Univ., San Diego, La Jolla.
F. Azam, B. B. Hemmingsen, and B. E. Volcani.
Archiv fur Mikrobiologie, Vol 92, No 1, p 11-20, July 10, 1973. 3 fig, 1 tab, 25 ref.

Descriptors: *Diatoms, *Growth rates, *Absorption, *Bioassay, Radioactivity techniques, Plant metabolism, Biochemistry, Cytological studies, Cultures, Toxicity.
Identifiers: *Germanium, Silicon, *Metabolic pathways, Transport, Viability, Nitzschia alba, Cylindrotheca fusiformis, Cyclotella nana, Navicula pelliculosa, Ge-68, Germanic acid, Silicic acid.

A non-photosynthic diatom, Nitzschia alba; two marine photosynthetic diatoms, Cylindrotheca fusiformis and Cyclotella nana; and a freshwater photosynthetic diatom, Navicula pelliculosa, were exposed to various ratios of Ge-68-labeled Ge (OH)4/Si (OH)4 (0.01, 0.1, or 1.0) in an attempt to trace the metabolic fate of Ge and to examine the possibility that Ge might follow the same metabolic pathway as Si. Cell counts, viability, Ge uptake and incorporation, isotope discrimination, silicic acid uptake, and effects of Ge on metabolism were determined. The diatoms took up labelled germanic acid from their growth media and incorporated up to 80 percent of it into the silica of their cell walls. Silicification appeared to be required for germanium incorporation. The uptake and incorporation of germanic acid was dependent upon the relative concentrations of Ge and Si. At Ge/Si of 0.01, no inhibition of growth or of silicic acid uptake by N. alba was observed. The cell morphology was also normal and 60 to 80 percent of the Ge-68 taken up was incorporated. At Ge/Si of 0.1, silicic acid uptake and growth of N. alba were inhibited by about 95 percent. Concomitantly, striking morphological aberrations occurred. 10 to 20 percent of the Ge-68 (OH)4 taken up was incorporated. The possible use of labeled Ge (OH)4 for the study of silicon metabolism is discussed. (Little-Battelle)
W74-03280

EDAPHIC FACTORS AND WILT OF CORIANDER,
Rajasthan Univ. Jaipur (India).
U. S. Srivastava.
Indian Phytopathol. Vol 24, No 4, p 679-683. 1971 (1972).
Identifiers: *Coriander, *Edaphic factors, Fusarium-Oxysporum-f-Corianderii, Moisture, Mortality, *Soil temperature, *Wilt, Hydrogen ion concentration.

The influence of soil temperature on disease development was studied in soil temperature tanks at 20, 24, 28, and 33C plus or minus (1C). A maximum wilting of 75% occurred at 28C; avobe or below this temperature mortality percentage decreased. Population of the pathogen (Fusarium oxysporum f. corianderii) was also highest at this temperature. Maximum mortality (60.71%) occurred in pH 5.8-6.9. Disease percentage increased with increase in moisture holding capacity (MHC). However, the population of the pathogen was highest at 52% MHC, much below the saturation point.--Copyright 1973, Biological Abstracts, Inc.
W74-03281

THE OCCURRENCE OF MICROTURBELLARIA IN SOME BRITISH LAKES OF DIVERSE CHEMICAL CONTENT,
Liverpool Univ. (England). Dept. of Zoology.
J. O. Young.
Archiv fur Hydrobiologie, Vol 72, No 2, p 202-224, July 1973. 6 tab, 30 ref.

Descriptors: *Calcium, *Lakes, *Population, *Distribution patterns, Water quality, Sampling, Separation techniques, Essential nutrients, Nutrient requirements, Seasonal, Aquatic habitats, Nutrients.
Identifiers: *Turbellari, Flatworms, England, Catenula lemnae, Stenostomum grabbskogense, Stenostomum leucops, Stenostomum unicolor, Microstomum lineare, Macrostomum distinguendum, Macrostomum johni, Macrostomum rostratum, Prorhynchus stagnalis, Geocentrophor baltica, Geocentrophora sphyrocephala, Plagiostomum lemani.

The distribution and seasonal occurrence of Microturbellaria in three different habitats in the littoral zone of calcium-rich, lowland, 'productive' lakes and calcium-poor, upland, 'unproductive' lakes were investigated over the course of a year using tree different sampling methods. Sampling methods, and methods used in the extraction from samples and identification of Microturbellaria are described. Eleven species occurred in both lake types, eight species occurred in Ca-rich lakes, and eleven species occured in Ca-poor lakes. The total number of species collected from 6 calcium-rich and 6 calcium-poor lakes visited at monthly intervals over a year ranged from 9 to 12 species and 3 to 18 species, respectively. Species recorded frequently seemed to have a wide distribution within the range of habitats considered in each lake. Species with a more restricted habitat distribution were these recorded only infrequently. A study of the vertical distribution of Microturbellaria on the floor of a calcium-rich lake suggested that some species were confined to the littoral and other species occurred also in the deeper water. The peak number of specimens recorded in calcium-poor and calcium-rich lakes occured in July and May to July, respectively. Ecological notes are presented on some of the common species found. (Little-Battelle)
W74-03282

STUDIES ON PHYTOPLANKTON IN RELATION TO ITS PRODUCTION AND SOME PHYSICAL-CHEMICAL FACTORS IN LAKE SVINSJOEN,
Oslo Univ. (Norway). Dept. of Limnology.
A. Lande.
Archiv fur Hydrobiologie, Vol 72, No 1, p 71-86, June 1973. 8 fig, 6 tab, 19 ref.

Descriptors: *Primary productivity, Dominant organisms, *Physicochemical properties, Radioactivity techniques, *Cyanophyta, *Diatoms, *Dinoflagellates, *Chlorophyta, Phytoplankton, Hydrogen ion concentration, Iron, Manganese, Phosphates, Calcium, Magnesium, Dissolved oxygen, Alkalinity, Sodium, Potassium, Sulfates, Chlorides, Bicarbonates, Sampling, Specific conductivity, Water quality, Trophic level, Biomass.
Identifiers: Lake Svinsjoen, *Norway, *Dark bottle method, Orthophosphates, C-14, Anabaena flos-aquae, Tetraedron punctulatum, Closterium aciculare, Pediastrum boryanum, Staurastrum gracile, Cyclotella comta, Synedra acus, Tabellaria flocculosa, Fragilaria crotonensis, Ceratium hirundinella.

Limnological investigations were carried out during 1968 and 1971 on Lake Svinsjoen, a moderately eutrophic lake about 30 km southwest of Oslo. Investigations included measurements of primary production, quantitative phytoplankton, pH, specific conductivity, Fe, Mn, orthophosphate, Ca, Mg, oxygen, alkalinity, Na, K, sulfate, chloride, and bicarbonates. Primary production was determined by the dark bottle method and by C-14 uptake. Samples were collected from various depths with a transparent Ruttner water sampler and transferred to glass and polyethylene bottles for analysis. The results show that pH values lie between 7.0 and 9.0 in mixolimnion during the summer season, and the calcium content is about 30 mg/1. The orthophosphate content is about 10-15 micrograms/1 in mixolimnion during the winter, but the summer measurements show values below 3 micrograms/1. The dominating phytoplankton species in 1971 were the diatoms Cyclotella comta and Synedra acus during May and June, and the Chlorophyta species Tetraedron punctulatum during July and August. The highest number of Tetraedron cells was 9,200,000 cells/1, found in August 1971. The two methods of determining primary productivity on some occasions gave different results which were difficult to justify. A study of the relation between the primary production and the standing crop of phytoplankton, shows that the daily renewal coefficient lies between 1.0 and 0.3 in Svinsjoen. (Little-Battelle)
W74-03284

CHRONIC EFFECT OF LOW PH ON FATHEAD MINNOW SURVIVAL, GROWTH AND REPRODUCTION,
National Water Quality Lab., Cincinnati, Ohio. Newton Fish Toxicology Lab.
D. I. Mount.
Water Research, Vol 7, No 7, p 987-993, July 1973. 4 tab, 9 ref.

Descriptors: *Hydrogen ion concentration, *Fish physiology, *Toxicity, *Water pollution effects, *Bioassay, *Growth stages, Animal growth, Fish behavior, Fish reproductions, Fish eggs, Laboratory tests, Lethal limit, Dissolved oxygen, Water quality, Alkalinity, Acidity, Hardness (Water), Freshwater fish.
Identifiers: *Fathead minnow, Pimephales promelas, Survival, Median tolerance limit, Teratogenicity.

Fathead minnows (Pimephales promelas) were continuously exposed to reduced pH levels of 4.5, 5.2, 5.9 6.6, and 7.5 (control) during a 13-month, one-generation test in order to measure the effect of such exposure on reproduction and growth of these fish. Since the TL sub 50 to the minnows was close to 4.0, two acute tests were performed in the same system after the chronic test to determine the lethal pH. Survival was not affected, even at the lowest pH tested. Fish behavior was abnormal, and fish were deformed at pH 4.5 and 5.2. Egg production and egg hatchability were reduced at pH 5.9 and lower, and all eggs were abnormal. A pH of 6.6 was marginal for vital life functions, but safe for continuous exposure. Free carbon dioxide, liberated by the addition of sulfuric acid to reduce the pH, may have had an unknown effect. The fish did not become acclimated to low pH levels. The TL sub 50 values in the acute tests were 4.05 and 4.2. In one test all fish died in the chamber maintained between pH 3.6 and 3.8, while all survived in Ph 4.5-4.6. In the other test 20 percent survived pH 4.1-4.3 and none died at 4.5. Since exact lethal levels were not essential and pH control was very difficult, no further refined testing was done. (Holoman-Battelle)
W74-03288

THE REALITY OF THREE BRITISH BIOTIC INDICES,
Vysoka Skola Chemicko-Technologicka, Prague (Czechoslovakia). Dept. of Water Technology.
For primary bibliographic entry see Field 05A.
W74-03289

THEORETICAL EFFECTS OF ARTIFICIAL DESTRATIFICATION ON ALGAL PRODUCTION IN IMPOUNDMENTS,
Harvard Univ., Cambridge, Mass. Lab. of Applied Microbiology.

M. Lorenzen, and R. Mitchell.
Environmental Science and Technology, Vol 7, No 10, p 939-944, October 1973. 5 fig, 1 tab, 21 ref.

Descriptors: *Destratification, *Impoundments, *Primary productivity, Effects, Limiting factors, *Eutrophication, Depth, Model studies, Aquatic productivity, Respiration, Biomass, Photosynthesis, Lakes, Reservoirs, *Mixing, Deficient elements, Growth rates, Light, Environmental effects, Water pollution effects.
Identifiers: *Nutrient depletion, Artificial mixing.

Artificial mixing is an important tool in the management of eutrophic lakes and reservoirs. Theoretical models of phytoplankton production are briefly reviewed and a model for application to mixed impoundments is derived. The model considers both nutrient depletion and the balance between photosynthesis and respiration as potential biomass limiting factors. The results of model calculations show that nutrient limited biomass is directly proportional to the depth of mixing, whereas light-limited peak biomass decreases linearly with increased depth of mixing. It is believed that in impoundments where artificial destratification is a successful control technique, nutrient limited algal blooms are replaced by light-limited blooms of smaller magnitude. The most important variables are the depth available for mixing and the attenuation of light in the water column. (Holoman-Battelle)
W74-03296

ACUTE TOXICITY OF BERYLLIUM SULFATE TO THE COMMON GUPPY,

Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio.
A. R. Slonim.
Journal Water Pollution Control Federation, Vol 45, No 10, p 2110-2122, October 1973. 1 fig, 7 tab, 25 ref.

Descriptors: *Toxicity, *Beryllium, *Bioassay, *Water pollution effects, Age, Absorption, Environmental effects, Water chemistry, Allkaline earth metals, *Lethal limit, Freshwater fish, Hydrogen ion concentration, Hardness (Water), Resistance, Water analysis, Chlorine, Dissolved oxygen, Specific conductivity, Alkalinity, Laboratory tests, Water temperature, Regression analysis, Correlation analysis.
Identifiers: *Guppy, Median tolerance limit, *Bioaccumulation, Lebistes reticulatus, Beryllium sulfate, Beryllium radioisotopes, Data interpretation, Buffers, Animal tissues, Intestine, Kidneys, Ovaries.

The acute toxicity of beryllium sulfate solutions to guppies was determined in five static bioassays. Other bioassays evaluated those factors that may affect the median tolerance limits such as the fish age, increase of pH, and previous exposure to beryllium. Some preliminary radioberyllium studies on Be uptake in guppies are presented to gain some insight into the mechanism of Be toxicity. The 96-hour median tolerance limit was 20.3 mg/l in hard water and 0.19 mg/l in soft water. Acute toxicity was independent of fish age but reduced to some extent by buffering the solutions. Proper preexposure conditioning significantly increased the tolerance of guppies to very toxic concentrations. Radio-beryllium data on exposed fish and some individual organs, as well as on the effects of various factors on beryllium uptake, were reviewed in conjunction with the toxicity data. These results indicate that the toxicity and lethality may not depend on the amount of beryllium concentrated within the fish, but more likely on the effect on a particular target organ or cellular or subcellular component. (Holoman-Battelle)
W74-03297

EFFECTS OF RESIDUAL CHLORINE ON AQUATIC LIFE,

National Water Quality Lab., Duluth, Minn.
W. A. Brungs.
Journal Water Pollution Control Federation, Vol 45, No 10, p 2180-2193, October 1973. 3 tab, 157 ref.

Descriptors: *Aquatic life, *Water pollution effects, *Industrial wastes, *Pollutant identification, *Waste water (Pollution), *Municipal wastes, Toxicity, Aquatic animals, On-site tests, Laboratory tests, Chlorination, Methodology, Lethal limit, Mortality, Waste water treatment, Effluents, Marine animals, Marine plants, Persistence, Aquatic plants, Chlorine, Water quality, Water quality standards, Chemical wastes, Trout, Salmon.
Identifiers: *Chlorine residual, Species diversity, Dechlorination, Chloramines, Amperometric titration, Carcinogenicity, Iodometry, Chlorophenols, Coho salmon, Smallmouth bass, White sucker, Largemouth bass, Fathead minnow, Black bullhead, Golden shiner, Scuds, Daphnia magna, Median tolerance limit, Green sunfish, Continuous flow technique, Species diversity index, Gammarus pseudolimnaeus, Pouch snails, Orconectes virilis.

Increased use of chlorine and recent studies of residual chlorine toxicity in aquatic systems have emphasized the need for close scrutiny of present disinfection procedures. This review discusses chlorine uses and chlorine chemistry and emphasizes toxicity studies in the field and in the laboratory. Interim criteria, based on knowledge to date, for permissible concentrations of total residual chlorine are: (1) in areas receiving wastes treated continuously with chlorine, not to exceed 0.01 mg/l for the protection of more resistant organisms only, or not to exceed 0.002 mg/l for the protection of most aquatic organisms; and (2) in areas receiving intermittently chlorinated wastes, not to exceed 0.2 mg/l for a period of 2 hr/day for more resistant species of fish, or not exceed 0.04 mg/l for a period of 2 hr/day for trout and salmon. If free chlorine persists, more restrictive criteria are warranted. Alternate procedures or substitutes for chlorination should be investigated. (Holoman-Battelle)
W74-03298

HALF-SATURATION CONSTANTS FOR UPTAKE OF NITRATE AND AMMONIA BY RESERVOIR PLANKTON,

Oklahoma State Univ., Stillwater. Dept. of Zoology.
D. W. Toetz, L. P. Varga, and E. D. Loughran.
Ecology, Vol 54, No 4, p 903-908, Summer 1973. 6 fig, 4 tab, 16 ref.

Descriptors: *Absorption, *Ammonia, *Nitrates, *Plankton, *Reservoirs, Water temperature, Nitrogen compounds, Cyanophyta, Aquatic algae, Radioactivity techniques, Tracers, Nitrites, Laboratory tests, Surface waters, Anabaena, Kinetics, *Oklahoma.
Identifiers: Lake Carl Blackwell, Half saturation constants, Sample preparation, Michaelis-Menten equation, Transparency, Sample preservation, Particulate nitrogen, Lake Keystone, Substrate concentration, Anacystis, Nodularia, Aphanizomenon, Oscillatoria, Turnover rates, Vertical distribution.

Observations were made in order to learn if the uptake of NH4 and NO3 by freshwater plankton can be described by the Michaelis-Menten expression. Uptake of NO3 and NH4 by reservoir plankton was estimated at 5 concentrations using N-15 tracer techniques. A hyperbola results when the uptake velocity (v) of NO3 and NH4 is plotted against concentration (S). The S/v vs S transformation of the Michaelis-Menten expression was used to estimate K sub s. For a mixed population of blue-green algae in Lake Carl Blackwell, Oklahoma, K sub s was about 43 mg NO3-N/ (cu m), when the initial concentration was 7.53 mgNO3-N/ (cu m). In Lake Keystone, where the initial concentration of NO3-N was 419.17 mg/ (cu m), enrichment with NO3 increased v in a similar way, suggesting use of the Michaelis-Menten model may not be realistic. (Holoman-Battelle)
W74-03299

SEASONAL CHANGES IN POPULATION DENSITY AND VERTICAL DISTRIBUTION OF PROSOBRANCE VELIGERS IN OFFSHORE PLANKTON AT PLYMOUTH,

Reading Univ. (England).
V. Fretter, and D. Shale.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 3, p 471-492, August 1973. 10 fig, 2 tab, 22 ref.

Descriptors: *Larval growth stage, *Ecological distribution, *Gastropods, Mollusks, Invertebrates, Salinity, Water temperature, Vertical migration, Plankton, Larvae, Snails, Water sampling, Marine animals, *Distribution patterns, Speciation, Animal populations.
Identifiers: *Veligers, *Population density, *Seasonal variation, Vertical distribution, Sample preservation, Marine environment, Phaeocystis, Lacuna vincta, Littorina littorea, Littorina neritoides, Cingula semistriata, Alvania crassa, Alvania punctura, Rissoa sarsi, Rissoa inconspicua, Rissoa parva, Rissoa membranacea, Tornus subcarinatus, Turritella communis, Caecum imperforatum, Bittium reticulatum, Cerithiopsis tubercularis, Cerithiopsis barleei, Triphora perversa, Aclis minor, Balcis alba, Balcis devians.

Vertical and horizontal hauls were taken at approximately fortnightly intervals from April 1969 to April 1970 at L 3 (lat. 40 degrees 17.7 minutes N, long. 4 degrees 11.2 minutes W) and L 4 (lat. 50 degrees 15 minutes N, long. 4 degrees 12.5 minutes W). Thirty-two species of prosobranch veliger were present at L 3; these larvae were not as numerous at L 4 and only 26 species were recorded. The number of species was highest in the summer: the number of veligers was highest in February. After mid October both the number of species and the abundance of veligers decreased rapidly and remained low until early February. Veligers of some species occurred later at L 3 and L 4 than in more inshore waters and these were probably individuals carried beyond tidal influences which would normally lead to settlement on the shore. They included Lacuna vincta, Littorina littorea and L. neritoides. Veligers of all ages were found at all depths. At their time of greatest abundance veligers of many species occurred maximally at 5 or 10 m, with a variable decrease towards greater depths and a sudden one towards the surface. This distribution later changed giving a proportionally greater number at greater depth. When numbers were low the larvae scattered through the water column with little or no indication of a preferred depth. An examination of the age composition of veligers of rissoids, Natica alderi, Nassarius reticulatus and Philbertia linearis from certain catches showed that the surface accumulation at the time of abundance was composed of a high percentage of young veligers: in an ageing population there was a higher percentage of larvae, especilly the older ones, at greater depths, except for Nassarius reticulatus which consistently showed maximal numbers above 10 m until the larvae became scarce. When blooms of Phaeocystis occurred they affected the distribution, driving the larvae away from the surface. (Holoman-Battelle)
W74-03300

BROWN SEAWEED AS AN INDICATOR OF HEAVY METALS IN ESTUARIES IN SOUTH-WEST ENGLAND,

Marine Biological Association of the United Kingdom, Plymouth (England). Plymouth Lab.
G. W. Bryan, and L. G. Hummerstone.
Journal of the Marine Biological Association of the United Kingdom, Vol 53, No 3, p 705-720, August 1973. 8 fig, 3 tab, 11 ref.

Descriptors: *Phaeophyta, *Kelps, *Estuarine environment, *Heavy metals, *Bioindicators, *Water pollution, *Pollutant identification, Plant tissues, Chemical analysis, Water analysis, Marine algae, Marine plants, Estuaries, Copper, Zinc, Lead, Manganese, Iron, Trace elements, Water sampling, Water quality, Ecological distribution, Aluminum, Surface waters, Salinity, Tidal effects, Methodology.
Identifiers: Seasonal variation, England, Biological magnification, Fucus vesiculosus, Tamar Estuary, Restronguet Creek, Fal Estuary, Dart Estuary, Camel Estuary, Sample preparation, Vertical distribution, Atomic absorption spectrophotometry, Flame emission spectrophotometry.

Concentrations of copper, zinc, lead, aluminum, manganese and iron in the brown seaweed Fucus vesiculosus have been measured in samples collected over its range of distribution in four estuaries having different degrees of metal contamination. Factors controlling the concentrations in the weed have been studied and include ithe concentrations of metals in the water, seasonal changes, the position of the weed in the intertidal zone and the particular portion of the plant which is analyzed. It is concluded that analysis of the weed gives a reasonable indication of average conditions in the water at points along an estuary and provides a method of making comparisons with the same estuary in subsequent years or with other estuaries. (Holoman-Battelle)
W74-03301

THE ZOSTERA EPIFAUNAL COMMUNITY IN THE YORK RIVER, VIRGINIA,
Florida Atlantic Univ., Boca Baton. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W74-03302

MORTALITY OF MARKET-SIZED OYSTERS (CRASSOSTREA VIRGINICA) IN THE VICINITY OF A DREDGING OPERATION,
Maryland Univ., Solomons. Natural Resources Inst.
C. D. Rose.
Chesapeake Science, Vol 14, No 2, p 135-138, June 1973. 1 fig, 1 tab, 10 ref.

Descriptors: *Mortality, *Dredging, *Sedimentation, *Environmental effects, Oysters, Mollusks, Marine animals, Spoil banks, Bottom sampling, Shellfish farming, Shellfish, Estuarine environment, Invertebrates, *Louisiana.
Identifiers: *Eastern oyster, Crassostrea virginica, Palmetto Bayou (La), Macroinvertebrates, Data interpretation.

The oyster lease in Palmetto Bayou, southern Louisiana, was inspected 4-5 months after dredging occurred to determine sediment-induced damage to market-sized oysters. It was assumed that mortality near the spoil bank would exceed that at site further from the bank. The average mortality of market-sized oysters collected at seven sampling stations within 595 m of a spoil bank crossing the oyster lease was 57 percent, as compared to an average mortality of 17 percent of the remainder of the lease. Sediment (2-15 cm thick) commonly covered oysters taken from the affected area. Theoretical mortality was estimated to be 48 percent. (Holoman-Battelle)
W74-03305

COMPARATIVE ECOLOGY AND ZOOPLANKTON OF TWO MARYLAND PONDS INCLUDING A CONGENERIC OCCURRENCE OF DIAPTOMUS (CALANOIDA: COPEPODA),
Edgewood Arsenal, Aberdeen Proving Ground, Md.
J. C. Smrchek.
Chesapeake Science, Vol 14, No 3, September 1973, pp 188-196. 1 fig, 7 tab, 42 ref.

Descriptors: *Zooplankton, *Ecology, *Ponds, Freshwater, *Crustaceans, Copepods, Invertebrates, Physicochemical properties, Aquatic plants, Speciation, Water chemistry, Waterfleas, Growth stages, Rotifers, Carbon dioxide, Dissolved oxygen, Hardness (Water), Hydrogen ion concentration, Aquatic animals, Surface waters, Air temperature, Water temperature, Chara, Submerged plants, Oak trees, Water analysis, Benthic fauna, *Maryland.
Identifiers: *Species abundance, Macrophytes, Liverwort, Ricciocarpus natans, Macroinvertebrates, Calanoida, Liquidamber styraciflua, Ilex opaca, Quercus palustris, Quercus phellos, Jussiaea repens var. glabrescens, Acer rubrum, Nyssa sylvatica, Prunus serotina, Duck potato, Reed grass, Great duckweed, Pickerelweed, Water starwort, St. John's-worts, Tupelos, Red maple, Diaptomus (Onychodiaptomus) birgei, Nauplii, Copepodids, Water primrose, False loosestrife, Ludwigia palustris, Sedges, Cyperus strigosus, Hypericum.

Two freshwater ponds, one permanent (Pond 1) and the other temporary (Pond 2), located on the western Maryland shore of the upper Chesapeake Bay were studied periodically from April 1970 to January 1971. Periodic physiochemical data, plant and zooplankton samples, and general seasonal observations were obtained. The temporary pond became dry in mid-September and remained so until late November. Free carbon dioxide, dissolved oxygen, and hardness fluctuated irregularly throughout the study. In August the pH in the permanent pond decreased greatly with little subsequent recovery. After Pond 2 again contained water, hardness increased to over 400 percent of values before drying. Lists of aquatic flowering plants were prepared for both ponds. Each pond contained a distinct assemblage of zooplankters probably influenced by the amount of aquatic vegetation present. Total zooplankton species numbers in each pond were almost equal, but the temporary pond contained greater quantities of zooplankton. Two generations per year of D. sanguineus were found in Pond 2. Eubranchipus vernalis (Verrill) and E. holmani (Ryder) were found in December in Pond 2; the general life cycle of these anostracans is briefly outlined. A congeneric occurrence of two calanoid copepods Diaptomus birgei Marsh and D. sanguineus Forbes was found in May in temporary Pond 2. Both are of the same subgenus (Onychodiaptomus Light). Various causes and mechanisms explaining congeneric occurrences are briefly reviewed. Slight size differences, insufficient time due to several factors discussed, for competitive exclusion to operate to completion, and partial seasonal separation appear to best explain the present co-occurrence. (Holoman-Battelle)
W74-03308

THE BIOLOGY OF BROWN ALGAE ON THE ATLANTIC COAST OF VIRGINIA. II. PETALONIA FASCIA AND SCYTOSIPHON LOMENTARIA,
Kent State Univ., Ohio. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W74-03309

A CONTRIBUTION TO THE ECOLOGY AND DISTRIBUTION OF AQUATIC ACARI IN THE ST. LAWRENCE GREAT LAKES,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
R. F. Modlin, and J. E. Gannon.
Transactions of the American Microscopical Society, Vol 92, No 2, p 217-224, April 1973. 1 fig, 2 tab, 21 ref.

Descriptors: *Ecological distribution, *Great Lakes, *Aquatic habitats, *Ecology, Limiting factors, Speciation, Animal groupings, Invertebrates, Plankton, Benthic fauna, Aquatic animals, Mites, Lake Erie, Lake Michigan, Lake Huron, Lake Superior, Bottom sampling, Water sampling, Animal populations, Profundal zone, Littoral, Systematics, Aquatic plants.
Identifiers: *Water mites, *Hydracarina, Neuston, Species abundance, Sample preservation, Arachnids, Lake St. Clair, St. Mary's River, Hammond Bay, Thunder Bay, Green Bay, Sampling equipment, Arrenurus americanus, Arrenurus apetiolata, Arrenurus manubriator, Atractides indistinctus, Axonopsis, Eylais desecta, Eylais extendens, Forelia cooki, Frontipoda americana, Hygrobates longipalpis, Koenikea, Lebertia porosa, Limnesia fulgica, Limnesia histrionica, Limnesia maculata, Limnesia paucispina, Limnesia undulata.

Aquatic Acari were investigated in benthic, planktonic, and neustonic habitats in Lakes Michigan, Huron, Superior, and St. Clair. Sampling was carried out using bottom grab samplers, plankton nets and specially designed floating nets modified from Zaitsev (1963). The mites were preserved in 10 percent formalin in the field and transferred to Koenike's solution in the laboratory. Temporary mounts were made in 50 percent lactic acid solution. Of the 382 Great Lakes specimens examined, 15 genera and 21 species were found. These collections increased the number of known Great Lakes water mites to 21 genera and 32 species. The water mites were not abundant in terms of biomass nor species composition. The scarcity of aquatic vegetation is an important limiting factor. Benthic littoral and sublittoral habitats had the greatest numbers of individuals and species. Species composition and biomass diminished rapidly with depth. Hygrobates longipalpis and Lebertia porosa were most abundant and widely distributed in benthic habitats. Piona rotunda and Unionicola crassipes were most common in the plankton and Hydrozetes, Limnohalacarus, and Soldanellonyx were unique to the neuston. (Holoman-Battelle)
W74-03314

BIOTIC CHARACTER AS RELATED TO STREAM MINERAL CONTENT,
North Dakota Univ., Grand Forks. Dept. of Biology.
J. K. Neel, Sr.
Transactions of the American Microscopical Society, Vol 92, No 3, p 404-415, July 1973. 7 tab, 29 ref.

Descriptors: *Ecological distribution, *Water quality, *Kentucky, *Virginia, Biological properties, Natural streams, *Benthos, Aquatic animals, Aquatic plants, Water chemistry, Bottom sampling, Water sampling, Aquatic algae, Invertebrates, Systematics, Organic matter, Mollusks, Aquatic insects, Annelids, Crustaceans, Water analysis, Mineralogy, Phosphorus, Nitrogen, Submerged plants, Diatoms, Ammonia, Clams, Nitrites, Crayfish, Snails, Alkalinity, Hardness (Water), Magnesium, Calcium, Leaves.
Identifiers: *Montane streams, *Mineral content, Sample preservation, Macroinvertebrates, Flatworms, Autotrophy, Sampling methods, Sample preparation, Turbellaria, Goniobasis, Mountain laurel, Rhododendron, Dogwood trees, Tulip trees, Liriodendron, Phormidium, Calothrix breviarticulata, Lyngbya major, Debris, Potamogeton, Heteranthera, Mud plantain, Stigeoclonium lubricum, Cladophora glomerata, Tuomeya fluviatilis, Macrophytes, Platyhelminthes, Bugs, Stenonema spp, Alderflies, Moths, Cymbella spp, Orb snails.

Nine montane streams in or near deciduous forests in eastern Kentucky and western Virginia were studied in relation to those factors involved in the level of autotrophism and benthos composition present. Samples of vegetation and macrobenthos were collected during each of several collecting trips and the water was analyzed for 02 (one time), alkalinity, hardness, Ca, Mg, inorganic P, ammonia, and nitrite nitrogen. Algae and other plants were scraped or pulled from the bottom,

macrobenthos was taken with a Surber net from movable materials, submerged vegetation, and along bank overhangs, and naiad clams and crayfish were often picked up or caught by hand. Vegetation was preserved and stored in 2-4 percent formaldehyde solutions. Diatoms were later cleaned in acid and mounted in Hyrax. Macrobenthos was fixed in formalin, washed with water, sorted, and stored in alcohol. Parts for microslides were cleared in Euparol essence and mounted in diaphane. The streams fell into two distinct classes with respect to hardness and alkalinity - five with these values below 30 mgl (Type B streams) and four with them exceeding 50 mgl (Type A streams). B streams contained as much or more phosphorus and nitrogen as the A's, but had no vegetation other than very sparse algal growth, and, with one exception, lacked molluscs. Type A streams had abundant flowering plants and/or algae at all seasons and well-developed mollusc populations. Benthic insects also showed definite A and B characteristics, although the two stream types had a number of forms in common. Neither degree of shading nor stream size seemed primarily involved in scarcity of plants in B streams. Allochthonous debris was more concentrated in B streams. In one stream system the biota changed from B to A in character with downstream mineral increase. (Holoman-Battelle)
W74-03317

OBSERVATIONS ON RED COLORED CELLS OF PERIDINIUM WISCONSINENSE EDDY FROM BUCKHORN LAKE, ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
K. H. Nicholls.
Transactions of the American Microscopical Society, Vol 92, No 3, p 526-528, July 1973. 1 fig, 8 ref.

Descriptors: *Dinoflagellates, Color, *Life cycles, *Phytoplankton, Aquatic algae, Pyrrophyta, *Canada, *Eutrophication, Microscopy, Pollutant identification, Seston.
Identifiers: *Peridinium wisconsinense, Buckhorn Lake (Ont.), *Cell size, Flagellates.

Plankton samples taken from Buckhorn Lake, a eutrophic lake, revealed that Peridinium wisconsinense, widely distributed in the lake, exhibited a red coloration which masked the normal yellowish-brown pigment. The dimensions of 25 cells were recorded to determine a relationship, if any, between cell size and the red color. The red color of active cells in the plankton was not related to abnormally large cell size as has been believed for other species of Peridinium. Because the red color in active cells appears to be the result of preparation for encystment, it is suggested that P. wisconsinense has a cycle of encystment and excystment similar to that of P. cinctum f. westii. (Holoman-Battelle)
W74-03320

TOXICITY BIOASSAY OF HEAVY METALS IN WATER USING TETRAHYMENA PYRIFORMIS,
Texas Univ. Medical School, San Antonio.
J. W. Carter, and I. L. Cameron.
Water Research, Vol 7, No 7, p 951-961, July 1973. 1 fig, 3 tab, 7 ref.

Descriptors: *Bioindicators, *Heavy metals, Bioassay, *Toxicity, *Water pollution effects, Protozoa, Cultures, Mercury, Cobalt, Zinc, Lead, Cadmium, Water (Hardness), Water pollution, Lethal limit, Invertebrates.
Identifiers: *Tetrahymena pyriformis, Synergistic effects, Median tolerance limit, Culture media.

The toxicities of five heavy metal compounds on the survival of the ciliated protozoan Tetrahymena pyriformis were determined. Three-day old cultured cells were exposed to five concentrations of each test compound in one or more of three water series; distilled, soft, and hard water. A culture of each sample was placed in a plastic petri dish and covered with mineral oil to prevent evaporation. The cells were counted initially, then again at 0.5 h, 1 h, 2 h, 1 day, 2 days, 3 days, and on the fourth day. Lethal threshold concentrations and tolerance limit medians were determined by graphic methods. On weight bases cadmium was most toxic, followed in decreasing toxicity by mercury, cobalt, zinc, and lead. Compared to similar fish data, all heavy metals were more toxic to T. pyriformis except lead. The toxicity of lead in soft versus hard water exemplified an antagonistic effect with greater than seven times the amount of lead necessary in hard water to produce comparable mortality as lead in soft water. On the other hand, the toxicity of mercury is about twice as great in hard water as in soft water (a synergistic effect). T. pyriformis appears to be a more sensitive indicator than fish of heavy metal contamination of water. T. pyriformis bioassay should prove a good means of determining the existence of many water pollutants. (Holoman-Battelle)
W74-03321

ORGANIC NUTRIENT FACTORS EFFECTING ALGAL GROWTHS,
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
G. C. McDonald, N. L. Clesceri, I. J. Kumar, and W. J. Green.
Copy available from GPO Sup Doc as EP1.23:660-73-003, $2.80; microfiche from NTIS as PB-226 877, $1.45. Environmental Protection Agency, Ecological Research Series, Report EPA-660/3-73-003, July 1973. 302 p, 56 fig, 45 tab, 101 ref. EPA Project 16010 DHN.

Descriptors: *Pollution abatement, Water quality control, *Algae, Cyanophyta, Chlorophyta, Analytical techniques, Bioassay, Chromatography, Spectrophotometry, *Bioassay, Chemical properties, Waste identification, Chemical wastes, Freeze-drying, Vacuum, *Nutrients, Eutrophication, *Organic wastes, *Photosynthesis, *Tertiary treatment, Thin films, Municipal wastes, *New York.
Identifiers: Selenastrum capricornutum, Anabaena flos-aquae, *Algal growth, Lake George (NY), Saratoga Lake (NY).

Effects of wastewater organic fractions on the growth rate of Selenastrum capricornutum and Anabaena flos-aquae were investigated. Effluent from a conventional activated sludge facility was membrane filtered, freeze-dried, and gel fractionated. Apparent molecular weights (AMW) were assigned to the appropriate fractions. These and organic carbon data showed 69% of the effluent organics has an AMW less than 700. Absorbancies and regression analyses within algal exponential growth phases demonstrated the control growth rate for Selenastrum was 0.43 and for Anabaena was 0.34. Selenastrum growth rates were monitored using Lake George water as the diluent for the media employed. An inhibition in growth occurred. Halving the nitrogen concentration in modified Gorham's had no significant effect on growth rate. In concentrating organics from natural water (Lake George and Saratoga Lake), raw sewage, and sewage effluent, thin film evaporation was preferred when using natural waters whereas freeze-drying was advantageous when working with sewage samples. Also, the soluble organic component in municipal wastewater was characterized and the effect of chemical-physical treatment on it has been shown. (EPA)
W74-03326

A STUDY OF BIOTROPISM OF CLIMATE IN TWO CANADIAN CITIES,
Meteorological Office, Poona (India).
B. Padmanabhamurty.
Int J Biometeorol. Vol 16, No 2, p 107-117. 1972, Illus.
Identifiers: Bronchitis, *Canada, *Cities, *Climates (Biotropism), *Human diseases, Neoplasm, Urbanization.

Climatic trends and effects on human health due to urbanization and industrialization of 2 Canadian cities during the last 30 yr were investigated. The frequency of thunderstorms, fog and smoke/haze days, cloud amount and dew point increased due to urbanization. Trends in mortality due to chronic bronchitis and neoplasm of the trachea, lung and bronchus suggest a positive effect of meteorological parameters.--Copyright 1973, Biological Abstracts, Inc.
W74-03478

ECOLOGICAL STUDIES ON DISSOLVED OXYGEN AND BLOOM OF MICROCYSTIS IN LAKE SUWA: I. HORIZONTAL DISTRIBUTION OF DISSOLVED OXYGEN IN RELATION TO DRIFTING OF MICROCYSTIS BY WIND,
Shinshu Univ., Suwa (Japan). Suwa Hydrobiological Station.
H. Yamagishi, and K. Aoyama.
Bul Jap Soc Sci Fish. Vol 38, No 1, p 9-16. 1972. Illus.
Identifiers: *Dissolved oxygen, Distribution, Drifting, *Ecological studies, *Japan (Lake Suwa), Lakes, *Microcystis bloom, Winds.

During the bloom season of Microcystis in Lake Suwa (Japan) the horizontal distribution of dissolved oxygen in surface waters was studied in relation to the drifting of the alga by winds. The studies demonstrated that dissolved oxygen in the lake increased from the windward to the leeward with concomitant increases in the density of drifting Microcystis and pH values: oxygen was markedly undersaturated on the windward (less than 50% saturation), but extremely supersaturated on the leeward (more than 250% saturation). Cell numbers of Microcystis reached 2.8 x 10 to the 8th power /ml at areas of highest density.--Copyright 1973, Biological Abstracts, Inc.
W74-03524

LAKE RESTORATION.

Compressed Air, Vol 78, No 10, p 11-16, 1973. 5 fig.

Descriptors: *Oxygenation, *Eutrophication, *Reaeration, *Hypolimnion, Nutrients, Water treatment, Oxygen, Algal control, Cold-water fish, *New York, Trout.
Identifiers: *Hypolimnion aeration, *Lake restoration, Lake Waccabuc (N.Y.), Lake Oscaleta (N.Y.), Lake Rippowam (N.Y.), Aeration systems, Limno aerator.

Various methods for alleviating eutrophication are described and details given of a community action leading toward preservation of New York lakes Waccabuc, Oscaleta, and Rippowam in cooperation with the Union Carbide Corporation. Three sampling stations were selected in each lake where oxygen, temperature, pH, alkalinity, turbidity, conductivity, and chlorophyll concentrations were measured. The profiles for all three lakes are characteristic of moderate levels of eutrophication. To oxygenate the hypolimnion, two aerators were installed by helicopter with air hoses connected to an on-shore air compressor discharging at 280 cfm. Two cylinders were put down some 45 feet near the deepest points in Lake Waccabuc, which was selected as the deepest of the lakes and the farthest downstream. The other two lakes are being used as 'controls' for eventual evaluation of the hypolimnetic aeration effects. Several thousand trout were stocked in Lake Waccabuc and their movements are being monitored. Benefits of the aeration may not be realized fully until 1974 because there is a time lag between the

time the nutrients are regenerated in the hypolimnion and when they may become available to the algae during the maximum algal growth season. (Jones-Wisconsin)
W74-03536

MATHEMATICAL MODELING OF EUTROPHICATION OF LARGE LAKES,
Manhattan Coll., Bronx, N.Y. Environmental Engineering and Science Program.
R. V. Thomann, D. M. DiToro, D. J. O'Connor, and R. P. Winfield.
Annual Report Year 1, April 1, 1972 - March 31, 1973. July 1973. 17 p, 10 fig. EPA R-800610.

Descriptors: *Mathematical models, *Eutrophication, *Lakes, *Lake Ontario, Phytoplankton, Trophic level, Grazing, Predation, Settling velocity, Mixing, Zooplankton, Kinetics, Epilimnion, Hypolimnion, Benthos, Chlorophyll, Nitrogen, Phosphorus, Cycling nutrients, Data collections, Stratification, Carbon, Great Lakes.
Identifiers: Large lakes, Interactive systems.

Modeling strategy developed for structuring the overall framework for study of Lake Ontario (and applicable to other large lakes) called for preparation of a preliminary model with emphasis on interactive kinetics of major eutrophication components. The resultant Lake 1 model is divided into two broad areas consisting of biological and chemical-biochemical sub-models. Interactions shown are both linear and non-linear. Detailed mathematical expressions are written for each system and interaction. The ten systems and the three spatial segments result in a total of 30 simultaneous non-linear differential equations to be solved. Several runs have been made using the Lake 1 model structure for the purposes of testing program elements, study behavior of the system and its sensitivity to various system parameters and inputs, and to prepare a preliminary verification of the model using data collected earlier. The model examined several areas including: variable levels of spring and fall vertical mixing, settling velocities for phytoplankton, zooplankton grazing rate, and zooplankton and higher-order predation using up to four trophic levels. The model is compared with observed data and indicates that some major features of phytoplankton and nutrient behavior can be reproduced and it provides a basis for extension to more detailed spatial computations. (Jones-Wisconsin)
W74-03537

NITRATE AND NITRITE IN THE SURFACE WATERS OF TWO DELAWARE SALT MARSHES,
Delaware Univ., Newark. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05B.
W74-03538

LOWER WATER TEMPERATURES WITHIN A STREAMSIDE BUFFER STRIP,
Forest Service (USDA), Asheville, N.C. Southeastern Forest Experiment Station.
For primary bibliographic entry see Field 04C.
W74-03551

HEAVY METALS IN THE SEDIMENTS OF THE DANUBE, EMS, WESER AND ELBE RIVERS IN WEST GERMANY, (IN GERMAN),
Heidelberg Univ. (West Germany). Laboratorium fuer Sedimentforschung.
For primary bibliographic entry see Field 05B.
W74-03552

DELAYED RECOVERY OF A MESOTROPHIC LAKE AFTER NUTRIENT DIVERSION,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. M. Emery, C. E. Moon, and E. B. Welch.
Journal Water Pollution Control Federation, Vol 45, No 5, p 913-925, May 1973. 6 fig, 2 tab, 23 ref.

Descriptors: *Nutrients, *Diversion, *Waste water (Pollution), Mesotrophy, Surface waters, Trophic level, *Eutrophication, Phosphorus, Dissolved oxygen, Primary productivity, Bioassay, Nitrates, Nitrites, Phytoplankton, Deficient elements, Seston, Cyanophyta, Turbidity, *Washington.
Identifiers: *Lake Sammamish (Wash), Recovery, Data interpretation, Lake Washington, Chlorophyll a, Orthophosphates, Transparency.

Limnologic conditions in Lake Sammamish (Washington) before an abrupt reduction of nutrient income (by way of wastewater diversion) are compared to those present in Lake Washington (Washington) before diversion. Lake Sammamish was relatively less enriched and eutrophied than was Lake Washington before diversion. The response of Lake Washington to nutrient diversion was shown by Edmondson to be prompt and complete and the actual time required for amelioration was approximately the same as the estimated recovery time using the Vollenweider lake recovery model. Lake Sammamish, with about the same estimated time for recovery, has shown no significant amelioration since nutrients were diverted in September, 1968. This lack of response may be related to morphometric and hydrologic characteristics, but other undetermined aspects of the lake and its treatment application may be preventing Lake Sammamish from recovering as quickly as Lake Washington. (Holoman-Battelle)
W74-03560

THE CHIRONOMIDS OF THE PERIPHYTON IN THE YUGOSLAV PART OF THE RIVER DANUBE (DIE CHIRONOMIDENFAUNA AUS DEM PERIPHYTON IN DER JUGOSLAWISCHEN DONAUSTRECKE),
Institute for Biological Research, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 05A.
W74-03562

FISHES AS INDICATORS OF WATER QUALITY AND THEIR SIGNIFICANCE FOR ECONOMIC USE (FISCHE ALS INDIKATOR DER GEWASSERGUTE UND IHRE BEDEUTUNG FUR DIE WASSERWIRTSCHAFTLICHE NUTZUNG),
Institute for Biological Research, Belgrade (Yugoslavia).
For primary bibliographic entry see Field 05A.
W74-03563

IODIDE OXIDATION BY A MARINE BACTERIUM,
Technion - Israel Inst. of Tech., Haifa. Dept. of Food Engineering.
For primary bibliographic entry see Field 05A.
W74-03565

COMPETITIVE GROWTH OF SEWAGE ORGANISMS,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
C. P. C. Poon, and K. K. Wang.
Journal of the Environmental Engineering Division, American Society of Civil Engineers, Vol 99, No EE4, p 489-498, August 1973. 3 fig, 1 tab, 14 ref.

Descriptors: *Sewage bacteria, *Fungi, *Water temperature, Cold resistance, Urban runoff, Asphalt, *Growth rates, *Competition, *Sodium chloride, Water pollution effects, Chlorides, Cultures, Bioassay, Growth rates, Dominant organisms, Chemical oxygen demand, Biochemical oxygen demand, Respiration, Environmental effects, Sewage treatment.
Identifiers: *Geotrichum candidum, Street salt.

Because of the occasional overgrowth of Geotrichum candidum in the Field Point Sewage Treatment Plant (Providence, R.I.) especially during winter, studies were undertaken to determine whether certain environmental factors, particularly street runoff, might give this fungus a competitive advantage over sewage bacteria. Growth characteristics of sewage bacteria and Geotrichum were compared by the Warburg respirometric technique under identical conditions when exposed to simulated salted snow melt at 10 and 20 C. The snow melt contained chloride ion concentrations of 5,000 and 10,000 mg/l and asphalt (with and without ultraviolet irradiation) 5-500mg/l. As expected, all activities under control conditions at 20 C, including oxygen uptake rate, specific growth rate, and rate of COD removal, indicated that the sewage fungus was less competitive. However, low temperature, slug doses of chloride ion at 5,000 mg/l and 10,000 mg/l concentrations, and the presence of ultraviolet irradiated asphalt were found to affect differently the growth of activated sludge and Geotrichum. Individually or in combination, these factors significantly reduced the growth activities of activated sludge while Geotrichum was much less affected under the same environment. It is concluded that such factors in combination with low pH and high carboyhdrate content in sewage could cause a predominance of sewage fungus in treatment plants. (Little-Battelle)
W74-03567

EFFECTS OF PESTICIDES ON EUGLENA GRACILIS. I. GROWTH STUDIES,
Kearney State College, Nebraska, Biology Department.
A. E. Poorman.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 1, p 25-28, July 1973. 3 tab, 4 ref.

Descriptors: *Bioassay, 2 4-D, 2 4 5-T, Aldrin, DDT, *Growth rates, Water pollution effects, *Pesticide toxicity, Inhibition, Inhibitors, Euglena.
Identifiers: *Organic solvents, Malathion, Parathion, Methoxychlor, *Euglena gracilis, Ethanol, Acetone.

Euglena gracilis was grown for one week in a 250-ml flask, the cells counted with a hemacytometer, and 9-ml aliquots distributed to culture tubes to study the effects of 2,4-D, 2,4,5-t, Aldrin Ac-10, DDT, Malathion, Parathion, and Methoxychlor on growth. Cells were also exposed to 95 percent ethanol and a 1 to 1 mixture of ethanol-acetone which were used to prepare the pesticide solutions. Tests were conducted for 24 hours with exposures of 100, 50, 10, 5, or 1 ppm pesticide and 1.0 percent solvent, and for seven days with 100, 50, and 10 ppm pesticide. Each experiment was conducted 5 or more times, and the cell numbers averaged for each series. The 24-hour tests show that the solvents had little effect on the cells, and in most cases 50 and 100 ppm of the pesticides significantly reduced growth with 2,4-D and 2,4,5-T being the most inhibitory. Concentrations of 10 ppm or less stimulated growth. The 7-day tests show that only the herbicides (2,4-D and 2,4,5-T) reduced growth and that only at the highest concentration. All other exposures stimulated growth. Further tests to study morphological alteration of cells which occurred with exposures to 50 and 100 ppm 2,4-D and 2,4,5-T showed that the effects were temporary. It is concluded that these pesticides are not a threat to Euglena since the concentrations required to inhibit growth are unlikely to occur in nature. (Little-Battelle)
W74-03571

DDT INHIBITION OF ACTIVE CHLOROPHENOL RED TRANSPORT IN GOLDFISH (CARASSIUS AURATUS) RENAL TUBULES,
Union Coll., Schenectady, N.Y. Dept. of Biological Sciences.

P. A. Gruppuso, and L. B. Kinter.
Bulletin of Environmental Contamination and Toxicology, Vol 10, No 3, p 181-186, September 1973. 2 fig, 1 tab, 15 ref.

Descriptors: *Animal metabolism, *Inhibition, *DDT, Absorption, *Bioassay, DDE, DDD, Organic compounds, Inhibitors, Cultures, Pesticide toxicity, Biochemistry, Mode of action, Enzymes.
Identifiers: Transport, *Chlorophenol red, *Goldfish, DDA, Kidneys, Biological samples, Carassuis auratus, p-Aminohippurate, Iodopyracet, 2 4-Dinitrophenol.

Kidneys were excised from goldfish, placed in modified Forster's saline medium, teased with tweezers into loose masses of tubules, and about 0.5 mg placed in each depression of a multiple ceramic-ring slide. After removal of adhering medium, about 0.1 ml of medium containing 0.00002 M chlorophenol red was added. DDT and its metabolites, DDD, DDE, and DDA were added to investigate their effect on epithelial cell transport of organic anions such as phenol red. Incubation was carried out for up to 3 hours in a moist chamber at 18-20 C. Every 15-30 minutes, depression slides were removed, the media drawn off and replenished, and the teased masses evaluated for dye uptake. An arbitrary visual rating on a 1 to 5 color scale was made for the functioning tubules, the ratings for comparable depressions averaged, and dye-uptake curves generated using a least squares, curve-fitting computer program. To validate the method, dose-response data were also obtained for two known competitive inhibitors, PAH (p-aminohippurate) and Diodrast (iodopyracet), and the metabolic uncoupler, DNP (2, 4-dinitrophenol). DDT and its non-polar metabolites, DDD and DDE, were clearly inhibitory at 0.0001 M. The polar metabolite, DDA, appeared to be a more effective inhibitor than DDT. The rapidity of the inhibition indicates that metabolic conversion of DDT is not required for the inhibition. Three mechanisms are proposed which may underly the toxicity of DDT and like compounds. (Little-Battelle)
W74-03573

OBSERVATIONS ON THE ECOLOGY AND DISTRIBUTION OF THE TURBELLARIAN FAUNA OF THE DANUBE DELTA (BEOBACHTUNGEN UBER DIE OKOLOGIE UND VERBREITUNG DER TURBELLARIENFAUNA IM DONAU-DELTA),
Bucharest Univ. (Romania). Faculty of Biology.
V. Mack-Fira, and M. Cristea-Nastasescu.
Archiv fur Hydrobiologie, Suppl 44, No 2, p 266-268, March 1973. 2 ref.

Descriptors: *Ecology, *Ecological distribution, *Aquatic habitats, Aquatic animals, Speciation, Systematics, Aquatic environment, Estuarine environment, Salt tolerance, Heat resistance.
Identifiers: *Turbellaria, *Danube delta, Flatworms, Platyhelminthes, Eurytopic organisms, Catenula lemnae, Stenostomum unicolor, Stenostomum leucops, Microstomum lineare, Castrella truncata, Microdalyellia tennessensis europaea, Gieysztoria virgulifera, Typhloplana viridata, Strongylostoma radiatum, Strongylostoma cirratum, Papiella otophthalma, Mesostoma lingua, Mesostoma productum, Bothromesostoma personatum, Gieysztoria exedita, Gieysztoria triquetra, Oligochoerus, Mesostoma ehrenbergi, Olisthanella, Phaenocora.

An account is given of the turbellarian fauna of the three main regions of the Danube Delta: river, river-marine and predeltaic. Eurytopic, euryhaline and eurythermal species could be distinguised. The Turbellaria of the Danube Delta are, with few exceptions, wide-spread in other Rumanian inland waters. (Holoman-Battelle)
W74-03574

COMPLEXING CAPACITY OF NATURAL WATER - ITS SIGNIFICANCE AND MEASUREMENT,
Dept. of Environment, Burlington (Ontario). Centre for Inland Waters.
For primary bibliographic entry see Field 05A.
W74-03578

THE EFFECT OF DISCONTINUOUS METHANOL ADDITION ON THE GROWTH OF A CARBON-LIMITED CULTURE OF PSEUDOMONAS,
Imperial Chemical Industries Ltd., Billingham (England). Agricultural Div.
J. D. Brooks, and J. L. Meers.
Journal of General Microbiology, Vol 77, No 2,p 513-519, August 1973. 3 fig, 20 ref.

Descriptors: *Pseudomonas, *Growth rates, Hydrogen ion concentration, Dissolved oxygen, Carbon dioxide, Amino acids, Centrifugation, Specific gravity, Chromatography, Fermentation, *Cultures, Methodology.
Identifiers: *Methanol, Continuous cultures, Pseudomonas methyltropha, Fermenters.

A study was undertaken to investigate an earlier observation that regular oscillations in pH and DO tension occurred in carbon-limited cultures of Pseudomonas methylotropha growing continuously at low dilution rates. These oscillations occurred with the same frequency as the addition of the methanol carbon source. P. methylotropha was isolated from soil and maintained on methanol agar slopes at 37C. The continuous culture equipment used allowed the mode of addition of methanol and nutrient salts solutions to be altered in four ways. As the interval between methanol additions was increased beyond 20 s the yield of bacterial dry wt/g of methanol fell significantly. Discontinuous methanol additions also caused cycling in the values of a number of parameters, including pH, dissolved oxygen tension, CO2 production and amino acid pool concentration. It is suggested that after each addition of methanol a burst of growth occurred, followed by a period of starvation. These observations are discussed in the light of continuous culture practice and theory. The results challenge established theories of how bacteria grow in continuous cultivation devices. If organisms growing in the apparatus that is normally used by microbiologists are in fact growing discontinuously, with bursts of growth happening with a regularity that depends on the imposed dilution rate, than the explanations offered by many authors for variations in different phenomena with 'growth rate' must be reconsidered. (Mortland-Battelle)
W74-03584

DIBUTYL- AND DI- (2-ETHYLHEXYL)PHTHALATE IN FISH,
Food and Drug Directorate, Ottawa (Ontario). Food Research Labs.
For primary bibliographic entry see Field 05A.
W74-03590

EFFECT OF POLLUTION ON THE BLOOD CHARACTERISTICS OF TILAPIA ZILLII G.,
Alexandria Univ., (Egypt). Dept. of Oceanography.
M. A. H. Saad, A. Ezzat, and M. B. Shabana.
Water, Air, and Soil Pollution, Vol 2, No 2, p 171-179, June 1973. 2 fig, 2 tab, 30 ref.

Descriptors: *Water pollution effects, *Dissolved oxygen, Fish, *Bioassay, Pesticides, Fertilizers, Lakes, Brackish water, Industrial wastes, Organic matter, Mortality, Coagulation, Proteins, Toxicity, Fish physiology, Fishdill, Cichlids.
Identifiers: *Tilapia zillii, Blood, *Egypt (Lake Mariut), Leucocytes, Erythrocytes, Haematocrit, Hemoglobin, Albumin, Globulin, Serum, Creatinine, Blood sugar, Biological samples, Body fluids.

Lake Mariut, a shallow brackish water basin neat Alexandria (U.A.R.) was a highly productive lake; however, it now receives large quantities of pollutants resulting in greatly reduced or depleted DO. The extremely low 02 content of the lake water has had hazardous effects on fish. Tilapia zillii G., which constitute a major part of the Egyptian lake fisheries, were sampled from Lake Mariut in order to study the effect of 02 deficiency on the blood characteristics of these fish. Under the stress of asphyxia, Tilapia showed a considerable increase in all blood constituents. The erythrocytes of asphyxiated Tilapia were characterized by a smaller corpuscular volume and a higher mean corpuscular hemoglobin count. A marked increase in total proteins, alpha globulin, glucose and creatinine was observed in asphyxiated fish. The results obtained from the experimentally asphyxiated fish and fish sampled from the 02 deficient area of Lake Mariut are nearly similar. It can be concluded that when the fish enters this 02 deficient area it begans to undergo asphyxiation, after which it may die. (Mortland-Battelle)
W74-03591

CARBON DIOXIDE AND PH: EFFECTS ON SPECIES SUCCESSION OF ALGAE,
Woods Hole Oceanographic Institution, Mass.
J. C. Goldman, and J. Shapiro.
Science, Vol 182, No 4109, p 306-307, October 19, 1973. 9 ref.

Descriptors: *Limiting factors, *Dominant organisms, *Carbon dioxide, *Hydrogen ion concentration, *Succession, Growth rates, Nutrients, *Cyanophyta, Enzymes.

Arguments are presented to refute Shapiro's hypothesis (see W73-08249) that predominance of blue-green algae results from a lowering of aqueous C02 concentration as the pH rises in natural waters. Three objections are presented: (1) that algal growth is not controlled by free C)2 concentrations, (2) that the pH can affect the availability of nutrients other than CO2, and (3) that the result of changing the pH may be through its effects on algal enzymes that may be involved in nutrients transport. Shapiro's responses to these objections are also presented. (Little-Battelle)
W74-03594

TOXICITY OF LEAD NITRATE TO ALGAE,
State Univ. Coll., Plattsburgh, N.Y. Dept. of Biological Sciences.
J. L. Malanchuk, and G. K. Gruendling.
Water, Air, and Soil Pollution, Vol 2, No 2, p 181-190, June 1973. 2 fig, 5 tab, 19 ref.

Descriptors: *Toxicity, Lead, Aquatic environment, *Nitrates, *Algae, Anabaena, Chlamydomonas, Radioactivity techniques, Cultures, Carbon dioxide, Primary productivity, Ecosystems, Phytoplankton, Bioassay, Photosynthesis, Heavy metals, Aquatic algae.
Identifiers: *Lead nitrate, Culture media, Ochromonas.

The fixation of radioactive C was used to measure the toxicity of Pb (N03)2 to five species of freshwater algae. Portions of unialgal cultures were inoculated into low salt medium and were used to test all species at 10, 20 and 30 ppm Pb. This medium approximated the salt concentrations of natural aquatic environments. Three different cell weights were used for each concentration of Pb and for the control to determine a relationship between cell weight and toxicity. The concentration of Pb causing a 50 percent reduction of C-14-labelled C02 fixation as compared to the control was called the ED sub 50 (median effective dose). These values were extrapolated from graphs of ppm Pb vs dpm/mg dry cell weight. The ED sub 50 for three of the species tested (Anabaena, Chlamydomonas and Navicula) was between 15 and 18 ppm Pb. A desmid, Cosmarium, had an ED sub 50 of 5 ppm. This species has a higher surface:

volume ratio than the other species tested and this may account for its increased sensitivity. An ED sub 50 for Ochromonas was not obtained. Throughout this experiment the fixation of C-14-labelled C02 increased with increasing Pb concentrations and is not readily explained. (Mortland-Battelle)
W74-03595

DISTRIBUTION OF FORAMINIFERA NEAR POLLUTION SOURCES IN CHALEUR BAY,
Bedford Inst., Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 05B.
W74-03596

DISSIMILATORY REDUCTION OF INORGANIC SULFUR BY FACULTATIVELY ANAEROBIC MARINE BACTERIA,
Woods Hole Oceanographic Institution, Mass.
J. H. Tuttle, and H. W. Jannasch.
Journal of Bacteriology, Vol 115, No 3, p 732-737, September 1973. 5 tab, 26 ref.

Descriptors: *Marine bacteria, *Sulfur, *Reduction (Chemical), *Anaerobic bacteria, *Sulfides, Cultures, Proteins, Hydrogen ion concentration, Growth rates, Chromatography, Volumetric analysis, Fermentation, Microbial degradation.
Identifiers: Sulfites, Thiosulfates, Tetrathionates, Trithionates, Bacterium paratyphosum, Citrobacter, Desulfavibrio, Nitrosomonas, Nitrobacter, Culture media, Substrate utilization.

Growth experiments were conducted utilizing newly isolated facultatively anaerobic marine bacteria for the purpose of demonstrating dissimilatory reduction of thiosulfate and sulfite. Three strains of the isolates, which resembled a thiobacilli-type bacteria, were used. Inorganic sulfur compounds other than sulfate, were anaerobically reduced in a basal salts medium in three patterns: (1) sulfite and thiosulfate were reduced to sulfide, and tetrathionate was reduced to thiosulfate; (2) tetrathionate was reduced to thiosulfate only; or (3) thiosulfate was reduced to sulfide only when pyruvate was the substrate. Comparison of anaerobic growth in the presence or absence of inorganic sulfur compounds indicated true dissimilatory reductions. Evidence that these reductions involve dissimilation of inorganic sulfur are (1) the failure of the bacteria to grow anaerobically in the absence of a reduced sulfur compound, or (2) the significant increase of anaerobic growth in the presence of a reduced sulfur compound. The observed increase may be an expression of increased growth rate, increased cell yield, or both. The reduction of tetrathionate by the isolates 12W and 16B appears to be consistent with that described for Bacterium paratyphosum-B and Citrobacter. Although none of the isolates was able to use sulfate as an electron acceptor, it is clear that assimilatory reduction of sulfate occurs when sulfate is the sole sulfur source in growing cultures. (Mortland-Battelle)
W74-03597

IN SITU EXPERIMENTAL INVESTIGATIONS OF THE BIOMASS PRODUCTION OF MICRO--ALGAE AND OF NATURAL ALGAL BIOCOENOSES IN FLOWING WATERS, (IN GERMAN),
Jena Univ. (East Germany). Biology Section.
W. Braune.
Int Rev Gesamten Hydrobiol. Vol 57, No 2, p 227-256. 1972. Illus. (English summary).
Identifiers: Algae, *Algal biocenoses, *Biomass (Algae), Box, Chlorophyll, Filters, *Germany (Thuringia), Methods, Nitrogen, Phosphorus, Pollution, Production, Scenedesmus-Obliquus, Seasons, Sewage.

A 'filter-box' method was utilized (using glass tubes closed with permeable membrane filters). This permits quantitative experiments for the first hand sutdy of algal life under biotope-like conditions in flowing waters. Information is presented about further results of such investigations with regard to: the biomass production of a test alga (Scenedesmus obliquus) and natural river-water biocenoses respectively (comparisons of cell number, dry weight, chlorophyll, total N and total P) and the spontaneous development of algae and the biomass production of river-water samples during all seasons of the year: comparison of test points situated above and below the town of Jena (Thuringia, Germany). Also using this method, the deterioration of river water condition below the town became evident in that alpha-mesosaprobe algae dominated. Both the results of counts of organisms and of species, as well as the biomass of algae produced were distinctly higher above the town than below it (in accordance with the conditions in the natural colonization of the biotope). The general coincidence of the biomass production in the filter -boxes with the natural behavior in the corresponding biotope speaks for the biotope-like character of these investigations. The box method provides better results than descriptive methods because it eliminates accidents and provides quantitative accuracy. The results of the filter-boxmethod are used to calculate rates of productivity, turnover anc the evaluation of energy conversion.--Copyright 1973, Biological Abstracts, Inc.
W74-03598

MERCURY-SELENIUM CORRELATIONS IN MARINE MAMMALS,
Agricultural Univ., Wageningen (Netherlands). Dept. of Toxicology.
J. H. Koeman, W. H. M. Peeters, C. H. M. Koudstaal-Hol, P. S. Tjioe, and J. J. M. de Goeij.
Nature, Vol 245, No 5425, p 385-386, October 19, 1973. 1 fig, 2 tab, 15 ref.

Descriptors: *Mercury, *Toxicity, *Correlation analysis, *Marine animals, Statistical analysis, Water pollution effects.
Identifiers: *Methylmercury, *Selenium, Dolphins, Porpoises, Seals (Animals), Biological samples, Detoxification, Liver, Brain, Data interpretation.

Data on Hg and Se concentrations in the livers of dolphins, porpoises, and common seals showed a strong correlation of these two elements (correlation coefficient of 0.932). Work in progress indicates a similar correlation for the brain. This result suggests that the correlation reflects a causal relationship between mercury and selenium in marine animals. Se may have a protective effect against the toxic action of Hg in these animals as has been found in rats and Japanese quails. Additional observations that Hg in seal liver and brain is tightly bound and could not be recovered in the form of methylmercury may support the suggestion that Hg and Se occur together in animal tissues and are associated to proteins by means of S. (Little-Battelle)
W74-03603

EFFECTS OF HIGHWAYS ON SURFACE AND SUBSURFACE WATERS,
Southeastern Massachusetts Univ., North Dartmouth. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04C.
W74-03607

THE ATYPICAL PHOSPHATE CYCLE OF ESTUARIES IN RELATION TO BENTHIC METABOLISM,
Rhode Island Univ., Kingston. Narragansett Marine Lab.
H. P. Jeffries.
Narragansette Marine Laboratory Contribution No 44. p 58-68, August 1962. 3 fig, 2 tab, 13 ref.

Descriptors: *New Jersey, Estuaries, *Mixing, *Nutrients, Phosphates, *Seasonal, Nitrates, Hydrography, Bays, Temperature, *Estuarine environments.
Identifiers: *Raritan Bay (NJ), Flushing.

This report describes the phosphate and nitrate cycles of Raritan Bay, NJ which due to a combination of natural and man-made influences, demonstrate aspects of estuarine nutrient dynamics with the clarity of a laboratory experiment. The characteristic summer increase in phosphate content of New England and Middle Atlantic estuaries, coincident with a sharp drop in the N03:P04 ratio, can be qualitatively explained with existing information. The phenomenon, obviously of extreme importance in understanding estuarine productivity, is a manifestation of seasonal changes in several rates, both physical and biological. The processes are not peculiar to estuarine systems, but they appear to exert a greater effect, arising from the fundamental properties of the environment, than in the open ocean. Data are not available to assess these rates quantitatively; only their relative importance can be inferred. (Sinha - OEIS)
W74-03626

DYNAMICS OF PHYTOPLANKTON IN THE LOWER VOLGA AND THE MAIN CHANNELS OF ITS DELTA, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Dept. of General Biology.
L. N. Voloshko.
Gidrobiol Zh. Vol 8, No 3, p 28-33. 1972, Illus.
Identifiers: Bacillariophyta, Channels, Chlorophyta, Chrysophyta, Cyanophyta, Delta, Diatoms, Dynamics, Euglenophyta, Greens, *Phytoplankton, Pyrrophyta, Seasonality, *USSR (Volga River).

The distribution of Bacillariophyta, Chlorophyta, Cyanophyta, Pyrrophyta, Euglenophyta and Chrysophyta in the lower Volga and its delta (USSR) was studied in the spring, summer and autumn of 1964, 1968 and 1969. Under conditions of substantial flow diatomaceous algae predominated; blue-green and green algae were present in smaller, but significant, quantities. Three zones in the main channel were delineated according to species distribution and quantity. The middle portion of the main channel before the delta was most productive. Phytoplankton were relatively scarce in the upper region near the dam. Seasonal variations in each region are discussed. With substantial flow rates vertical distribution was relatively even.--Copyright 1973, Biological Abstracts, Inc.
W74-03646

STAGNANT SEA,
S. H. Fonselius.
Environment, Vol 12, No 6, p 6-11, 40-48, July-August 1970. 5 fig, 2 tab, 5 photo, 20 ref.

Descriptors: *Basins, *Water pollution, *Eutrophication, *Salinity, *Oxygen, Anaerobic condition, Organic wastes, Sewage, Oil pollution, Radioactive wastes, Pesticides, Nutrients, Water properties, Industrial wastes, Viruses, Bacteria, Dissolved oxygen, Stagnant water, Water pollution effects.
Identifiers: *Baltic Sea.

The Baltic Sea is generally considered to be a stagnant basin, a semi-enclosed sea area with a restricted oxygen supply to the deep water, caused by narrow and shallow connections to the ocean and the existence of a light surface water layer which isolates the deep water from oxygen exchange with the atmosphere. Due to poor water circulation, most of the oxygen remains in the surface layer, while dead plants and animals sink to the bottom. In the deep water, anaerobic bacteria produce hydrogen sulfide, ammonia and nitrogen. When the deep water does mix with the surface

water, the large quantities of inorganic nutrients support algae which proliferate, die and cause depletion of the oxygen essential to marine life. The problem is aggravated in the Baltic area by the enormous amounts of urban and industrial wastes discharged into the sea. In some countries pipelines have been constructed to protect nearshore areas from sewage pollution, but these effluents may be harmful to fisheries in areas with restricted water exchange. Heavy concentrations of marine algae, cuased by eutrophication through pollution, as well as viruses and bacteria harmful to man have been found in some coastal areas. (Ritchie-Florida)
W74-03712

READILY HYDROSABLE ORGANIC MATTER N BOTTOM SEDIMENTS OF LAKE BAIKAL, IN RUSSIAN),
L. A. Vykhristyuk, and F. I. Lazo.
zv Sib Otd Akad Nauk SSSR Ser Biol Med Nauk. p, 59-63. 1972. Illus. (English summary).
dentifiers: *Bottom sediments, Lakes, *Organic arbon (Hydrolyzable), *USSR (Lake Baikal), Organic matter.

The content of readily hydrolyzable organic C in ottom sediments of the central part of the North Baikal (USSR), ranges 0.5-0.1%, N 0.04-0.08%. In he Middle and South Baikal these values range rom 1.0-2.0 and 0.77-0.20%, respectively. In delta reas the concentration of movable organic matter s decreased in some cases as compared to adacent open areas and increased in the others. 'eculiarities of the distributions of readily ydrolyzable organic matter in surface layer of ediments is determined by unequal conditions of edimentation and disintegration in the deposits of pen Baikal regions and delta zones. In the sedinent thickness regular decrease in the content of eadily hydrolyzable organic matter is noted. On he whole, organic matter of the sediments studied ontains sufficient accumulation of easily utiliza- le organic matter, which determines the intensity f biological processes.--Copyright 1973, Biologi- al Abstracts, Inc.
V74-03715

TUDY OF A POLLUTED ENVIRONMENT THE OLD PORT AREA OF MARSEILLES): HE INFLUENCE OF PHYSICAL AND CHEMI- AL CONDITIONS ON THE CHARAC- ERISTICS OF THE POPULATION OF THE UAY, (IN FRENCH),
entre d'Oceanographie, Marseille (France). Sta- on Marine d'Endoume.
. Leung Tack Kit.
ethys. Vol 3, No 4, p 767-825. 1971 (1972). Illus. English summary).
lentifiers: Carbon, Chemical conditions, Deter- ents, *France (Marseilles), Nitrogen, Nutrients, hysical conditions, *Polluted environment, Popu- tion, Ports, *Quay, Salinity, Seston, Tempera- re, Dissolved oxygen.

he seasonal changes of several hydrological fac- rs (temperature, dissolved oxygen, salinity, trients, seston, particulate C and N, detergents), d their influence in the fauna and flora of the ay were studied. The hydrological data show the rculation in the 2 basins, the undersaturation of ssolved oxygen in the harbor water, its freshen- g and its important reserve of nutrients. These nditions are favorable to substantial plankton oduction. The great quantity of organic material aintains the biological degradation by an 'au- pollution.' The quay settlement is composed of association of species resistant to extreme con- tions and variations of the environment.--Copy- ght 1973, Biological Abstracts, Inc.
74-03719

5D. Waste Treatment Processes

REMOVAL OF PHOSPHATE FROM WASTE WATER BY ALUMINUM AND IRON, PHASE III,
Rutgers - The State Univ., Nee Brunswick, N.J. Dept. of Soils and Crops.
P. H. Hsu.
Available from National Technical Information Service as PB-226 878; $4.00 in paper copy, $1.45 in microfiche. New Jersey Water Resources Research Institute, Rutgers - The State University of New Jersey, Completion Report, November 1973. 7 p.

Descriptors: Phosphates, *Waste water treatment, *Iron, *Aluminum, *Chemical precipitation, Coagulation, Chemical reactions.
Identifiers: *Phosphate removal, Aluminum phosphate, Iron (III) phosphate.

Research has been carried on the chemical processes involved in the removal of phosphate from wastewater by compounds of aluminum and iron. Three subjects were investigated. The results are summarized as follows: (1) Effect of order of reactants mixing on the effectiveness of phosphate precipitation. A mere change in the order of reactants mixing resulted in different effectiveness of phosphate precipitation in many, but not all, cases. After prolonged analysis a working hypothesis has gradually been taking shape. (2) Effects of calcium and sulfate on the precipitation of phosphate using iron (III). The effectiveness of phosphate precipitation using iron (III) was greatly improved on the alkaline side of the optimum region by the addition of calcium and on the acidic side by the addition of sulfate. When both calcium and sulfate were present, phosphate was effectively precipitated over a wide range of pH varying from 2.6 to above 8. In addition, a two-step process has been developed for removing phosphate from solution. The consumption of coagulant for high-phosphate waste water can be greatly reduced with this proposed two-step process. Further investigation is being carried out to determine economic feasibility. (3) Aging of Fe3+ solutions. The results suggest that the size of colloidal iron (III) hydroxide greatly varies with the initial iron (III) concentration and acidity. The variation in particle size is the key factor governing the appearance and stability of hydrolyzed iron (III) solution. (See also W71-02272 and W72-13290)
W74-03208

TREATMENT OF DOMESTIC SEWAGE AT OFFSHORE LOCATIONS,
Linfield and Hunter, Inc., Vicksburg, Miss.
G. G. Hebert, and R. D. Bryant.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 99-108, 1973. 2 tab, 7 ref.

Descriptors: *Sewage treatment, *Water pollution control, *Offshore platforms, *Gulf of Mexico, Marshes, Oil industry, Sewage disposal, Domestic wastes, Aeration, Methodology, Ecology, Ecosystems.

Information is presented which describes the problems encountered in trying to provide adequate sewage treatment facilities for offshore platforms in the Gulf of Mexico. Until recently, the oil industry had not been confronted with the problem of having to provide sewage treatment facilities on its offshore platforms in the Gulf of Mexico or at its land based operations in the coastal marshes. However, in late 1970, with the advent of Federal regulation and the EPA, the increased activity of the Louisiana Stream Control Commission and the Department of Health in this area, and the issuance of OCS Order No. 8 by the United States Department of the Interior, Geological Survey, Conservation Division, Branch of Oil and Gas Operations, Gulf Coast Region, the necessity for sewage treatment became apparent. Packaged type extended aeration treatment units were selected for all offshore structures which had applied organic loads of sufficient magnitude to sustain satisfactory performance of units having a minimum aeration tank size of 1500 gallons. Marshland facilities were also provided with extended aeration plants when loading conditions were suitable and conditions for the construction of stabilization ponds were unsuitable. (See also W74-03212) (Woodard-USGS)
W74-03221

DESIGN AND OPERATION OF LAND TREATMENT SYSTEMS FOR MINIMUM CONTAMINATION OF GROUNDWATER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
H. Bouwer.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 23-33, 1973. 5 fig, 10 ref.

Descriptors: *Waste water disposal, *Artificial recharge, Hydrogeology, Infiltration, *Water reuse, Sprinkling, Biodegradation, *Arizona.
Identifiers: *Land disposal (Waste water), Salt River Valley (Ariz).

The use of land treatment systems for sewage effluent and other liquid wastes, as well as some solid wastes, poses a threat to the quality of the native groundwater even though the waste water itself undergoes a marked improvement in quality as it moves through the ground and becomes renovated water. To avoid large-scale spread of the renovated water into the groundwater basin, the renovated water should be collected again at some point by wells or drains for reuse or release into the surface water. For the Salt River Valley of Arizona, the effective transmissibility of the aquifer for recharge was evaluated from a pilot project and then used in the design of a full-scale system. This effective transmissibility was less than the aquifer transmissibility. (See also W74-03222) (Knapp-USGS)
W74-03223

SEDIMENT COLIFORM POPULATIONS AND POST CHLORINATION BEHAVIOR OF WASTEWATER BACTERIA,
Harris County Pollution Control Dept. Houston, Tex.
For primary bibliographic entry see Field 05A.
W74-03295

ORGANIC NUTRIENT FACTORS EFFECTING ALGAL GROWTHS,
Rensselaer Polytechnic Inst., Troy, N.Y. Fresh Water Inst.
For primary bibliographic entry see Field 05C.
W74-03326

NOMOGRAPHS FOR THERMAL POLLUTION CONTROL SYSTEMS,
Hittman Associates, Inc., Columbia, Md.
C. L. Jedlicka.
Copy available from GPO Sup Doc as EP1.23:660-73-004, $1.80; microfiche from NTIS as PB-226 868, $1.45. Environmental Protection Agency, Technology Series, Report EPA-660/2-73-004, September 1973. 171 p, 19 fig, 18 tab, 35 ref. EPA Project 16130 HKK. 68-01-0171.

Descriptors: *Thermal pollution, *Thermal power plants, Economics, *Water cooling, *Cooling towers, *Cooling water, Costs, Annual costs, Capital costs, Cost analysis, Electric power costs, Water consumption, Water loss, Graphical methods, Curves, Mathematical studies.
Identifiers: Cooling systems, Heat rejection systems, *Nomographs.

Nomographs are presented and described which permit the estimation of heat rejection system performance, tower or pond capital and the perturbations to power plant efficiency and costs which result from the incorporation and operation of any one of the following thermal pollution control systems within a power plant as a substitute for once-through cooling: natural draft wet towers, mechanical draft wet towers, spray ponds, cooling ponds, and natural and mechanical draft dry towers. The base case plant for cost comparisons is chosen as ' ıving a nominal turbine back pressure of 2 in. Hg absolute. The total heat rejection system with its associated costs is defined to extend outward from the turbine exhaust flange, a common boundary for each of the systems mentioned above. Performance and capital costs for the thermal pollution control systems were compared with data from existing facilities and theoretical estimates from various sources. The nomographs yield performance, water requirements and costs for heat rejection systems operating under design meteorological conditions and full load plant operation. Examples are presented to show how average annual water requirements from evaporation and average annual operating costs can be estimated. (EPA)
W74-03329

ENRICHMENT OF MARSH HABITATS WITH ORGANIC WASTES,
Louisiana Water Resources Research Inst., Baton Rouge.
W. G. Smith, and J. W. Day.
Available from the National Technical Information Service as PB-226 985, $3.00 in paper copy, $1.45 in microfiche. Completion Report, Nov. 1973. 7 p, 1 fig, 3 tab. OWRR A-033-LA (1).

Descriptors: *Marshes, *Land management, *Nutrients, Recycling, *Louisiana, *Organic wastes, *Water reuse, Soil analysis, Path of pollutants, Industrial wastes, Municipal wastes.
Identifiers: Dulac (La).

Municipal and industrial wastewater have created local problems, including eutrophication, plant nutrient loss, discharge-induced die-off of algal flora, and changes in chemical and biological character. Among methods used to solve these problems is that of overland runoff, and the project is an attempt to incorporate this method into an estuarine environment. A site in the subtropical coastal marsh at Dulac, Louisiana, home port facility for a menhaden processor, was selected: an artificially enclosed freshwater marsh, totaling about two and one-half square miles. Soil chemistry core samples were taken along the length of the marsh spoil apron every 75 ft. Measurements on extractable cations reveal the effects of continuous effluent application. Sampling stations for aquatic analysis, soil sampling, and microbial sampling are spaced at intervals from the points of wastewater discharge. Both general heterotrophic bacteria and proteolytic microbes are being measured at the same sites. The overall efficiency of land runoff in reducing the waste load should be reflected in the chemical oxygen demand and the total organic carbon at the sampling sites. (Alston-Louisiana)
W74-03337

THE EFFECTS OF SURFACE IRRIGATION WITH DAIRY MANURE SLURRIES ON THE QUALITY OF GROUNDWATER AND SURFACE RUNOFF,
Tennessee Univ., Knoxville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05B.
W74-03339

DAN REGION, ISRAEL, SEWAGE-RECLAMATION AND RECHARGE PROJECT,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Div. of Hydrology.
N. Columbus.
In: Underground Waste Management and Artificial Recharge, Vol 2, p 767-779, 1973. 6 fig, 1 tab.

Descriptors: *Reclaimed water, *Water reuse, *Artificial recharge, *Water spreading, Waste water treatment, Waste water disposal, Mixing.
Identifiers: *Israel.

The effluent forecast of the Dan region of Israel in 1980 is estimated at more than 100 million cu m per year, and 175 million cu m in the year 2000. A sewage-reclamation recharge project was conceived to solve both environmental hazards and water-resources management problems and consists of 2 phases, sewage reclamation and recharge of the reclaimed sewage. The area occupied by the spreading grounds consists of sand dunes, for the most part overlying calcareous sandstones. These formations constitute the main aquifer of the region. The reclaimed sewage will be spread alternately to allow the grounds to be dried and cultivated between recharge operations in order to remove the surficial crust and increase infiltration. It is estimated that the rate of percolation will be about 15 cm per day. An array of 30 production wells--drilled for the specific purpose of exploiting the recharged water--surrounds the spreading grounds. The water will be held in the subsurface for a period of 400 days, during which it will undergo natural filtration and mixing with existing groundwater. Following its subsurface movement and mixing, the reclaimed water will be pumped and conveyed to the National Water Carrier for transfer to the southern area of the country for supplementing irrigation requirements. (See also W74-03222) (Knapp-USGS)
W74-03359

OPTIMIZING WATER USE: THE RETURN FLOW ISSUE,
Colorado Univ., Boulder. School of Law.
For primary bibliographic entry see Field 06E.
W74-03385

RECYCLING ON THE LAND: AN ALTERNATIVE FOR WATER POLLUTION CONTROL,
Natural Resources Defense Council, Washington, D.C. Project on Clean Water.
H. Boyer, and B. Reid.
July 1973. 23 p, 1 biblio.

Descriptors: *Land management, *Waste water treatment, *Waste treatment, *Water treatment, *Water purification, Aquaculture, Infiltration, Percolation, Nutrients, Sewage effluents, Pollutants, Tertiary treatment, Public health.
Identifiers: Spray irrigation.

Recycling on the land is the method of purifying sewage wastewater by applying it to the land. This method produces saleable crops, prevents the discharge of pollutants to waters and recharges the natural groundwater supply. Using wastes as resources in this manner should be considered by each communities in response to the Federal Water Pollution Control Act amendment of 1972 (Amendments). The land treatment process uses soil, air, plants and bacteria to purify waste water and is also referred to as 'spray irrigation'. Land treatment may also refer to aquaculture, the infiltration percolation method and the spray-runoff method. This publication focuses on the system on which the sewage is partially treated and sprayed on the land for the production of crops and the recycling of the nutrients which are contained in most sewage effluents. The Amendments set a goal of zero discharge of pollutants by 1985. Presently there are three competing forms of tertiary treatment: advanced biological, physical-chemical, and land treatment. Land treatment is a complex system which must be carefully planned and engineered to assure that the rate of application of treated wastewater conforms to local climate, soil, vegetative and geologic conditions. (Sears-Florida)
W74-03387

SIMULATION OF A PETROLEUM REFINERY WASTE TREATMENT PROCESS,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical Engineering.
T. W. Hoffman, D. R. Woods, K. L. Murphy, and J. D. Norman.
Journal of the Water Pollution Control Federation, Vol 45, No 11, p 2321-2334, November 1973. 4 fig, 3 tab, 28 ref, 1 append.

Descriptors: *Simulation analysis, *Waste water treatment, Digital computers, *Computer models, *Treatment facilities, *Industrial wastes, Computer programs, Equipment, Operation and maintenance, Systems analysis.
Identifiers: *Petroleum refineries.

The strategy and results are given for a steady-state material balance simulation of a modern wastewater treatment process at the BP petroleum refinery in Trafalgar, Ontario. The simulation, based on plant operating data and laboratory bench-scale experimeonts, uses the GEMCS executive program within a CDC 6400 digital computer. These executive programs use the modular approach whereby the processing sequence is viewed as a sequence of modules or units of equipment that are analyzed one at a time as opposed to simultaneously. The unique features of industrial waste treatment as compared with most chemical and manufacturing processes, which make them difficult to simulate, are given. Dtails of each step in the strategy are presented: (1) defining objectives; (2) learning the process; (3) developing the stream list and information flow diagram; (4) preparing the models; and (5) using the simulation. The simulation duplicates normal operating conditions; data were not available for plant operation under different operating conditions and the model's predictions could not be tested fully. The simulation indicates that the strategy is valid and suggests the analyses of the components of the streams must be more fundamental. A combination of a plant testing and experimental research is required to provide a better understanding of the various units in the process. (Bell-Cornell)
W74-03467

A MATHEMATICAL MODEL FOR OPTIMUM DESIGN AND CONTROL OF METROPOLITAN WASTEWATER MANAGEMENT SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash.
A. Brandstetter, R. L. Engel, and D. B. Cearlock.
Water Resources Bulletin, Vol 9, No 6, p 1188-1200, December 1973. 6 fig, 2 tab, 11 ref.

Descriptors: *Waste water treatment, *Management, *Simulation analysis, *Dynamic programming, *Water pollution control, *Urban runoff, *Sewers, *Overflow, Design, Optimization, Mathematical models, Systems analysis, Cities.
Identifiers: Cleveland (Ohio).

The most economical approach to controlling untreated discharges in cities with combined sewers is to maximize utilization of the existing sewerage systems while minimizing the need for investment in system improvements and expansion. To determine the least-cost design and control, the wastewater management system must be analyzed in total. Presented is a comprehensive mathematical model (Urban Wastewater Management Model) developed to simulate continuously time-varying wastewater flows and qualities in complex metropolitan combined sewerage systems. Control optimization is accomplished using dynamic programming. The model serves three functions: (1) assessment of existing or planned system performance in relation to other wastewater discharges in either a metropolitan or river basin area; (2) determination of the optimum operation of existing or planned systems during rainstorms; and (3) determination of the most economically feasible combination of design alternatives for improving existing systems to meet specified performance criteria. The model provides an efficient

ngineering tool for evaluating and controlling pol-utant discharges from combined sewerage ystems to receiving waters, while considering ime and spacial variations of rainfall and dry-veather flows and qualities as well as economic onstrants. (Bell-Cornell)
V74-03468

UITABILITY OF FOOD PROCESSING WASTE VATER FOR IRRIGATION,
Agricultural Research Service, Norfolk, Va.
J. A. Pearson.
Environ Qual, Vol 1, No 4, p 394-397, 1972.
dentifiers: *Chlorides, Cucurbita-pepo-var-nelopepo, Electrical conductivity, *Food rocessing wastes, Ipomoea-batatas, *Irrigation, Lycopersicon-esculentum, Phaseolus-lunatus, Phaseolus-vulgaris, Pisum-sativum, Processing, Salinity, *Sodium, Solanum-tuberosum, Waste vaters, Zea-mays, Chemical oxygen demand, Water reuse.

The waste water from food processing contains issolved salts and organic matter. The amount of ach depends upon the product being processed nd the procedure being used. The suitability for rigation of food processing waste water from 20 lants processing 9 food products was assessed rom the standpoint of electrical conductivity EC), chloride and Na concentrations, Na adsorp-on-ratio (SAR), and chemical oxygen demand COD). Waste water from plants processing green eans (Phaseolus vulgaris L.), squash (Cucurbita epo var. melopepo Alef.), tomatoes (Lycoper-icon esculentum Mill.), corn (Zea mays L.), steam eeled potatoes (Solanum tuberosum L.) and weet potatoes (Ipomoea batatas Lam.), and oultry is suitable for irrigation under most condi-ons. Waste water from some pea (Pisum sativum .) and lima beans (Phaseolus lunatus L.) rocessing plants may be suitable for irrigation, ut is of questionable suitability from others. Vaste water from lye-peel potato processing is not uitable for irrigation.--Copyright 1973, Biological bstracts, Inc.
V74-03482

PGRADING LAGOONS,
rown and Caldwell, San Francisco, Calif.
. H. Caldwell, D. S. Parker, and W. R. Uhte.
nvironmental Protection Agency Transfer eminar Publication, August 1973. 20 fig, 10 tab, 7 ref.

escriptors: *Sewage treatment, *Biodegradation, Sewage lagoons, *Design criteria, Aerated goons, Waste water treatment, Treatment facili-es, Oxidation lagoons, Tertiary treatment, Algal ontrol, Odor, Biochemical oxygen demand, erobic treatment, Anaerobic digestion.
dentifiers: Facultative ponds, Technology ransfer.

agoons are one of the most commonly employed econdary waste treatment systems. Waste treat-ent lagoons can be divided into five general lasses according to the types of biological trans-ormations taking place in the lagoon: high-rate erobic ponds, facultative ponds, anaerobic onds, maturation or tertiary ponds, and aerated goons. Operating problems include organic atter in effluents, odors, noxious vegetative rowths, and seasonal performance variations. lany of the techniques available for upgrading goons treating primary and secondary effluents ave already been incorporated in designs at one r more locations -- often in the original construc-on and not as a modification. A well designed ond will incorporate physical features that inimize upsets, maintenance, and nuisances, and aximize operational flexibility, stability, and OD removal. Physical design features that hould be considered include configuration, recir-ulation, feed and withdrawal variations, pond ransfer inlets and outlets, dike construction, sup-plementation of oxidation capacity and algae removal. Case studies of Sunnyvale Water Pollution Control Plant, Los Banos Sewage Treatment Plant, and Stockton Main Water Quality Control Plant are presented as examples of upgrading ponds. (Slattery-Wisconsin)
W74-03495

OXYGEN ACTIVATED SLUDGE WASTE-WATER TREATMENT SYSTEMS: DESIGN CRITERIA AND OPERATING EXPERIENCE,
Union Carbide Corp., Tonawanda, N.Y. Linde Div.
E. A. Wilcox, and A. Thomas.
Environmental Protection Agency Technology Transfer Seminar Publication, August 1973. 46 p, 12 fig, 13 tab, 3 ref.

Descriptors: *Waste water treatment, *Activated sludge, *Design criteria, Treatment facilities, Aeration, Oxygen, Water pollution control, Oxygenation, Economic feasibility, Pilot plants, Operations, *Costs.
Identifiers: Unox system, Technology transfer, Air-activated sludge.

The use of oxygen instead of air in the activated-sludge process is one recent advancement in aiding pollution control. Three direct economic factors were given as reasons for selecting oxygen instead of air for the activated-sludge process. Higher mixed liquor solids under aeration can be maintained when using oxygen as the aeration gas, with occurrence of oxygen mass-transfer limitations. Concentrating the active biomass in a smaller volume reduces concrete tankage requirements, thus reducing costs. Higher oxygen-transfer efficiencies are made possible using oxygen as the aeration gas. These efficiencies lower equipment requirements for oxygen dissolution, with an attendant reduction in requirements for auxilary equipment, e.g. electrical switchgear. Power savings generally result from the higher oxygen mass-transfer efficiencies experienced in pure-oxygen processes. The power required to generate oxygen for the biological process added to that required for oxygen dissolution generally is less than that required to provide oxygen to a conventional activated-sludge process with air as the oxygen source. A comparative analysis between costs of using oxygen versus air in the activated-sludge process in four completed pilot-plant programs showed the costs to be consistently lower when oxygen was used. (Slattery-Wisconsin)
W74-03496

PRETREATMENT OF POULTRY PROCESSING WASTES: UPGRADING POULTRY--PROCESSING FACILITIES TO REDUCE POLLUTION,
A. J. Steffen.
Environmental Protection Agency Technology Transfer Seminar Publication 2, July 1973. 59 p, 24 fig, 3 tab, 13 ref.

Descriptors: *Poultry, *Waste treatment, *Treatment facilities, Pollution abatement, *Costs, Industrial wastes, Sewage disposal, Pollution taxes (Charges), *Waste water treatment, Cities.
Identifiers: *Poultry waste pretreatment, Sewer surcharges, Technology transfer.

Poultry waste pretreatment refers to the treatment of poultry wastes after the customary screening in flowaway systems and prior to discharge to a municipal sewer. The majority of poultry plants discharge to municipal sewers; whether pretreatment is required at a poultry plant frequently depends upon municipal regulations regarding some of the ingredients in the poultry wastes. Except for compulsory action to remove materials prohibited from entering city sewers, the degree of pretreatment is generally an economic decision and no simple set of parameters can be established because plants, and surcharges imposed by municipalities differ. Costs of pretreatment depend on factors such as size of the poultry plant, type of processing, space available for pretreatment, quality of in-house waste conservation, and pumping requirements. Types of poultry wastes pretreatment presented include: secondary screening only; secondary screening and separation of floatable and settleable solids by gravity, pressurized air flotation, or other means; separation of floatable and settleable solids as above, but without secondary screening; and secondary screening and separation of floatable and settleable solids, plus biological or chemical treatment for further BOD removal. (Slattery-Wisconsin)
W74-03497

IN-PROCESS POLLUTION ABATEMENT: UPGRADING POULTRY-PROCESSING FACILITIES TO REDUCE POLLUTION,
Environmental Engineering, Inc., Gainesville, Fla.
R. H. Jones, J. D. Crane, T. A. Bursztynsky, J. A. Macon, and J. E. Turner.
Environmental Protection Agency Technology Transfer Seminar Publication 1, July 1973. 28 p, 2 fig, 5 tab, 6 ref.

Descriptors: *Pollution abatement, *Waste water treatment, *Poultry, *Industrial wastes, Consumptive use, Water management (Applied), *Costs, Operation and maintenance, North Carolina.
Identifiers: *Poultry processing plants, Technology transfer.

The size and concentration of the poultry processing industry has caused concern in view of the industry's large volume of waste generation. In poultry processing feathers, blood, dirt, and viscera are removed from a product that must be made acceptable for human consumption. Large quantities of water are consumed in both washing and cleaning the poultry during processing and also in carrying away large amounts of wastes to screening and ultimate disposal. This study suggests ways water misuse can be prevented or corrected. Some suggestions to improve water management include the stunning of carcasses electrically at slaughter to prevent body movement and splattering of blood, reuse of screened chiller water as scalder feed water, and reuse of screened feather flume water in the feather flume. The Gold Kist Case Study (Durham, N.C.) illustrates the impact of in-plant process and equipment changes on water use and waste abatement in poultry processing. Results of this study may be used to direct operation improvement of other poultry plants. (Slattery-Wisconsin)
W74-03498

WASTE TREATMENT: UPGRADING METAL--FINISHING FACILITIES TO REDUCE POLLUTION,
Lancy Labs., Inc., Zelienople, Pa.
L. E. Lancy, and R. L. Rice.
Environmental Protection Agency Technology Transfer Seminar Publication 2, July 1973. 27 p, 6 fig, 1 tab, 25 ref.

Descriptors: *Waste water treatment, *Metals, *Water pollution, *Waste treatment, Water pollution control, Industrial wastes, Water reuse, *Costs, Consumptive use.
Identifiers: *Metal processing, Technology transfer, Sewer rental charges.

Metal processing in manufacturing includes a number of finishing steps that improve and condition the surface for further processing for the intended final purpose of an article. Most of these finishing steps employ wet processes and require rinsing steps. Water pollution is caused by the deliberate or accidential discharge of the processing solutions and contaminated rinse water. Commonly used waste treatment systems are: batch treatment, continuous treatment, integrated treatment, and non-exchange treatment.

Costs of waste treatment will depend on many factors. Waste treatment design should provide the best treatment in view of the mounting restrictions anticipated in the future. Water consumption and sewer rental charges should be considered as much a part of the overall cost as the chemicals used in treatment. Savings achieved in water reuse opportunities and from chemical and metal recovery steps built into the waste treatment scheme may allow economies to offset treatment costs, reducing overall operating costs. Increasing the supervisory and operating labor costs can be avoided only if the waste treatment system is integral, or at least close, to the processing area. Previous studies have shown that suitable waste treatment design in many installations may significantly reduce operating costs. (Slattery-Wisconsin)
W74-03499

UPGRADING EXISTING WASTEWATER TREATMENT PLANTS: CASE HISTORIES,
Hazen and Sawyer, New York.
D. Walrath.
Environmental Protection Agency Technology Transfer Seminar Publication, August 1973. 11 fig, 7 tab.

Descriptors: *Waste water treatment, *Treatment facilities, *Design data, Design standards, *Costs, Trickling filters, Activated sludge, Waste treatment.
Identifiers: *Case studies, Hydraulic-retention time, Solids retention time, Technology transfer.

Upgrading the performance of activated sludge and trickling-filter plants can be accomplished through modification of biological processes. Factors that may limit performance to less than optimum are inadequate hydraulic-retention or contact time and solids retention time. Different ways of overcoming these types of inadequacies are discussed in several case studies. Study sites include South Buffalo Creek Wastewater Treatment Plant at Greensboro, N.C., Livermore Wastewater Treatment Plant at Livermore Calif., and the Wards Island Wastewater Treatment Plant in New York, N.Y. Plant upgrading costs are included. (Slattery-Wisconsin)
W74-03500

HYDROGEOLOGIC CONSIDERATIONS IN LAND SPREADING OF SEWAGE TREATMENT-PLANT EFFLUENT IN CENTRAL FLORIDA,
Geological Survey, Winter Park, Fla. Water Resources Div.
F. A. Watkins.
In: Proceedings of the Land Spreading Conference at Orlando, Florida, July 15, 1971: East Central Florida Regional Planning Council, Winter Park, Florida, p 4-1--4-2, 1971.

Descriptors: *Waste water disposal, *Water reuse, *Hydrogeology, *Sprinkler irrigation, Irrigation water, Biodegradation, Surface-ground water relations, Infiltration, Water spreading.
Identifiers: *Spray irrigation, *Land spreading (Wastewater).

Disposal of waste water from sewage treatment plants in central Florida includes land-spreading techniques. Spreading also can be used to provide tertiary treatment resulting in disposal of an effluent that, under suitable hydrologic conditions and suitable treatment, should not adversely affect the quality of the water in the receiving environment. Land disposal involves study of total thichness of clastic material overlying the aquifer; head relations between the water table aquifer and the aquifer; the surface drainage pattern and head relations between surface water and ground water; the ability of the root-zone soils to absorb and retain effluent for removal of nutrients by plants; the thickness and lithology of the unsaturated zone in relation to adsorption and transmission of water and ion-exchange capability; and the water-transmitting properties of the saturated zone, the direction of water movement in this zone, and ion exchange, adsorption, and chemical reactions. (See also W72-13704) (Knapp-USGS)
W74-03518

RENOVATING SEWAGE EFFLUENT BY GROUND WATER RECHARGE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
H. Bouwer, J. C. Lance, and R. C. Rice.
In: Proceedings of the Land Spreading Conference at Orlando, Florida, July 15, 1971: East Central Florida Regional Planning Council, Winter Park, Florida, p 6-1--6-20, 1971. 3 fig, 2 tab, 14 ref.

Descriptors: *Water reuse, *Waste water treatment, *Artificial recharge, *Tertiary treatment, Biodegradation, Waste water disposal, *Arizona, Water spreading.
Identifiers: *Phoenix (Ariz), *Spray irrigation, *Land spreading (Wastewater).

A pilot project was installed in 1967 to determine if the tertiary treatment necessary to permit large-scale reuse of sewage could be obtained effectively and economically by using infiltration basins in the normally dry Salt River bed, Phoenix, Arizona. The hydrogeological conditions of the Salt River bed (about 3 ft of fine, loamy sand underlain by sand and gravel layers to great depth and a groundwater table at about 10 ft depth) are favorable for high-rate waste water reclamation by groundwater recharge. The infiltration rate in grass-covered basins is 25% higher, and in a gravel-covered basin 50% lower, than in a bare soil basin. Alternating 2-week inundation periods with 10-day dry-up periods yield an annual infiltration rate of about 400 ft. Reclaimed water, pumped from 30 ft depth in the center of the recharge area, has a biochemical oxygen demand of about 0.5 mg/liter (BOD of the sewage effluent is about 15 mg/liter) and a median fecal coliform density of 10 per 100 ml. Nitrogen is essentially all converted to the nitrate form in the reclaimed water. More nitrogen was removed under vegetated infiltration basins than under nonvegetated basins. Phosphate concentrations in the reclaimed water are around 5 ppm, as compared to 13 ppm in the effluent. (See also W72-13704) (Knapp-USGS)
W74-03520

ENGINEERING DESIGN CRITERIA FOR SPRAY IRRIGATION,
Bishop (William), Tallahassee, Fla.
W. M. Bishop.
In: Proceedings of the Land Spreading Conference at Orlando, Florida, July 15, 1971: East Central Florida Regional Planning Council, Winter Park, Florida, p 7-1--7-7, 1971.

Descriptors: *Waste water disposal, *Sprinkler irrigation, Tertiary treatment, Infiltration, Biodegradation, Waste water treatment, Water spreading, Florida.
Identifiers: *Tallahassee (Fla), *Spray irrigation, *Land spreading (Waste water).

A municipal spray irrigation field is used for disposing of treatment plant effluent in Tallahassee, Florida. In the area where the irrigation fields were planned, the soil is very sandy. The design loading on the soil was based on the recommended loading on a relatively slow sand filter, 125,000 gallons per acre per day. The two fields are alternated daily allowing 24 hours dosage and 24 hours resting. (See also W72-13704) (Knapp-USGS)
W74-03521

CLOSED WATER CIRCUITS IN A PAPER MILL PROCESSING WASTE PAPER,
Technische Universitaet, Darmstadt (West Germany). Wasser- und Abwasserforschungsstelle.
W. Brecht, and H. L. Dalpke.
Available from IPC, Appleton, Wis. 54911. Price: $5.00. Translated from Wochenblatt fuer Papierfabrikation, Vol 100, No 16, p 579-585, August 31, 1972. 17 p, 6 tab.

Descriptors: *Pulp wastes, *Water conservation, *Recycling, Pulp and paper industry, Europe, Effluents, Water circulation, *Water reuse, *Industrial water.
Identifiers: *Germany, Paper machines, White water, Fourdrinier machines, Coarse papers, Packaging papers.

A German paper mill which manufactures corrugating medium, packaging papers, and similar coarse and low-grade papers utilizes two fourdrinier machines with completely closed water circuits which cause essentially no effluent during normal operation or during weekly cleanup schedules. The manufacturing scheme is described, including diagrams of the pulp stock and water circulation systems. Although the closure of the water system has increased the concentrations of solids in the white water with attendant corrosion and slime deposit problems, these difficulties are amenable to technological solutions. No adverse effect on either the quality or the quantity of paper products has been noted. (Speckhard-IPC)
W74-03540

APPARATUS FOR AUTOMATIC CONTROL OF SEDIMENT LEVEL (PRIBOR DLYA AVTOMATICHESKOGO KONTROLYA UROVNYA OSADKA),
Ukrainski Nauchno-Issledovatelskii Institute Bumagi, Kiev (USSR).
M. L. Gomberg, V. V. Zhikharev, and I. T. Prilipko.
Bumazhnaya Promyshlennost', No. 2, p 24, February 1973. 2 fig, 1 tab.

Descriptors: *Instrumentation, *Automatic control, Water levels, *Settling basins, Sedimentation, *Indicators, Treatment facilities, Effluents, *Pulp wastes, Industrial wastes, Pulp and paper industry, Optical properties, Remote control, Valves, Gates, Pumps.
Identifiers: Level gages, *Sediment level indicators.

An indicator, designated 'SUO-1', for control of sediment levels in effluent-purification settling tanks is described. It operates on the principle of comparative light-scattering measurements of the sediment and the supernatant liquid layers. A beam from a light source reaches two photoresistors immersed in the two layers, respectively. Signals from these resistors are transmitted continuously to a remote-control panel where they trigger mechanisms that adjust the operation of pumps and gate valves. The SUO-1 apparatus was tested in several kinds of sedimentation tanks at the Solikamsk and Baikal pulp and paper mills (USSR) and is recommended for general use in the Soviet paper industry. (Stapinski-IPC)
W74-03541

EFFECT OF BARK ADDITION ON THE DEWATERING PROPERTIES OF BIOLOGICAL SLUDGES.
National Council of the Paper Industry for Air and Stream Improvement, Inc., New York.

NCASI Stream Improvement Technical Bulletin, No. 261, December 1972. 41 p, 10 tab, 7 fig, 1 append, 18 ref.

Descriptors: *Sludge treatment, *Dewatering, *Bark, *Filtration, *Vacuum drying, Sludge disposal, *Pulp wastes, Incineration, Coniferous

rees, Deciduous trees, Particle size, Wood vastes, Pulp and paper industry, Activated sludge. dentifiers: Filter aids, Filter cake, Materials andling.

A major problem of activated sludge treatment of ndustrial effluents is the difficulty of dewatering xcess biological cell solids generated during iooxidation of organic pollutants. Addition of in-rganic coagulants or organic polyelectrolytes al-eviates the problem only slightly. The dewatering f sludge mixtures is a function of the primary-to-econdary sludge ratio and of the amount of long-ibered matter in the primary sludge. Incorpora-ion of bark particles (which are otherwise in-inerated in steam generators) was found to acilitate sludge dewatering in vacuum filters; the esulting filter cake was readily pressed and urned in pulp mill power boilers. A detailed study f various bark types and particle sizes indicated hat softwood bark was superior to hardwood ark, and that the 20-40 mesh fraction was the ost effective. For satisfactory sludge handling, a ark-to-secondary sludge solids ratio of 3:1 was ecessary. The bark functions essentially as an in-epth filter aid, thus improving the porosity of the ixed sludge. Elimination of the 100-mesh fiber raction reduced the bark's effectiveness, but still ielded an acceptable filter cake. (Witt-IPC)
V74-03544

MILL WASTE TREATMENT BY FLOTATION AT DELAIR,
Georgia-Pacific Corp., Delair, N.J.
H. Gould, J. Walzer, and H. Lundgren.
Chem 26 -- Paper Processing, Vol 8, No 11, p 50-52, November 1972. 1 fig, 1 ref.

Descriptors: *Pulp wastes, Pollution abatement, *Waste water treatment, *Suspended solids, Water pollution treatment, *Treatment facilities, New Jersey, *Flotation, Pulp and paper industry, Water quality control, Regulation, Capital cost, Filters, Filtration, Delaware River Basin Commission, Delaware River.
Identifiers: Waste paper, Paper mills, Wallpaper.

At a cost of nearly $500,000 (including preliminary est work and consulting fees), Georgia-Pacific Corp. installed a commercial air-flotation system or removal of suspended solids from effluents of is paper mill in Delair, New Jersey, which roduces wallboard backings and facings entirely rom recycled waste paper fibers. The installation ollowed an unsuccessful trial with disk filter avealls in 1967 and a pilot study of the air flota-ion process in 1970. The new system is said to neet water quality specifications of the Delaware River Basin Commission, the State of New Jersey, nd the Army Corps of Engineers. (Witt-IPC)
V74-03545

FOREST INDUSTRY'S ENVIRONMENTAL POLLUTION CONTROL IN FINLAND. THE FINNISH FOREST INDUSTRY'S WATER PROTECTION INVESTMENT PROGRAMME.
Finnish Paper and Timber, Vol 23, No 9, p 117-122, 125, 129, 1972. 1 tab, 5 illus.

Descriptors: *Pollution abatement, Europe, *Pulp nd paper industry, *Treatment facilities, *Capital osts, Costs, Economics, Air pollution, Environ-nental control, *Waste water treatment, Planning, Project planning, Investment, Water pollution reatment.
Identifiers: *Finland.

Investments for effluent treatment and water pol-ution control made by the Finnish pulp, paper, uilding board, and allied forest products indus-ries amounted to 183 million Finnish marks in the 960's (based on 1969 monetary value), 62.8 mil-ion marks in 1970/71, and approximately 200 mil-ion marks in 1972/73. About 450-500 million marks are likely to be spent in the first half of the 1970's, of which projects costing over 200 million marks have already been committed and approved by the Water Court. Air protection investments to date are estimated at ca. one-fourth of those required for water protection. Details are presented of the environmental protection installations accomplished and planned by several major Finnish pulp, paper, hardboard, and paperboard mills. (Witt-IPC)
W74-03546

CONVENTIONAL TREATMENT METHODS FOR PULP AND PAPER MILL WASTES AND DISPOSAL ON LAND FOR IRRIGATION,
Central Public Health Engineering Research Inst., Nagpur (India).
B. B. Bhalerao, and S. R. Alagarsamy.
Ippta (Journal of the Indian Pulp and Paper Technical Association), Vol 9, No 1, p 24-30, January-March 1972. 2 fig, 8 tab, 17 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Soil disposal fields, *Sewage treatment, Pulp and paper industry, Effluents, Industrial wastes, Liquid wastes, Land use, Filtration, Oxidation, Biological treatment, Filters, Trickling filters, Irrigation.
Identifiers: Kraft mills, *India.

A review of sewage treatment methods and equipment, such as biooxidation and trickling filters, led to the conclusion that conventional processes can be modified so as to adapt them to the treatment of pulp and paper mill effluents, such as combined kraft mill discharges. The parameters which must be considered before disposing the treated effluents on land are discussed, notably the characteristics of different effluents, the intended use of the soil (agriculture, forestry, etc.), and the soil's tolerance for various hydraulic and organic loadings. (Wise-IPC)
W74-03547

PULP AND PAPER MILL WASTES TREATMENT; ALTERNATIVES AND COST ECONOMICS,
Central Public Health Engineering Research Inst., Nagpur (India).
S. R. Alagarsamy, and B. B. Bhalerao.
Ippta (Journal of the Indian Pulp and Paper Technical Association), Vol 9, No 1, p 40-48, January-March 1972. 12 fig, 9 tab, 3 ref.

Descriptors: *Pulp wastes, *Bleaching wastes, *Waste water treatment, *Comparative costs, *Economic efficiency, Oxidation, Aerated lagoons, Oxidation lagoons, Lagoons, Industrial wastes, Effluents, Pulp and paper industry, Costs, Operating costs, Capital costs, Maintenance, Treatment facilities, Anaerobic digestion, Sewage treatment, Waste treatment.
Identifiers: *India.

Conventional sewage-treatment methods are more recent low-cost waste treatment processes were compared for economic merits in treating various pulp and paper mill effluents. For mills with daily productions of 50 to 500 tons, an oxidation pond was found to be the cheapest alternative in treating combined paper machine white water plus bleach plant effluent, whereas anaerobic-aerobic lagoons seemed most economical for treating pulping wastes. Other than economic factors to be considered in selecting effluent treatment installations include availability, reliability, ease of operation, and maintenance of appropriate equipment. (Wise-IPC)
W74-03548

NEW COMPOSITE EFFLUENT-PURIFICATION EQUIPMENT (NOVYI KOMPLEKS OCHISTNYKH SOORUZHENII),
A. Yu. Skaisgiris, and I. M. Skorupskas.
Bumazhnaya Promyshlennost' No 3, p 21-22, March 1973. 1 fig.

Descriptors: *Treatment facilities, *Pulp wastes, *Bleaching wastes, *Waste water treatment, *Water conservation, Pulp and paper industry, Europe, Recycling, Water circulation, Industrial wastes, Sedimentation, Suspended solids, Filters, Clays, Flocculation, Pipes, Equipment.
Identifiers: White water, Black liquor, Savealls, *Lithuania (Neman River), Keramzit (Clay product).

Since 1970, the Yu. Ianonis integrated pulp and paper mill in Kaunas, Lithuania, producing printing papers from bleached pulp, has operated facilities for treatment of both white (clean) and black (polluted) waste waters, collected separately. Of the mill's ten conical savealls, six process 'clean' waters (from broke-handling thickeners and paper machine white water), the other four handle 'polluted' wastes (from wet presses, felt conditioners, spills, and machinery wash waters). While all savealls operate continuously, recovered fibers and fillers are removed periodically. Solids recovered from the 'clean' savealls are recycled to hydrapulpers for reuse in paper furnish. Sediment from the 'polluted' savealls is shipped to a nearby ceramic factory and reused in the manufacture of 'keramzit' clay-type filler. Clarified 'clean' waste water (20-30 mg of suspended solids/liter) is recycled as process water for freshwater conservation. Clarified 'polluted' waste water is discharged into the Neman River. All savealls have inlet pipes for metered dosage of flocculants, such as aluminum sulfate and polyacrylamide, but the installation provides 95-97% purification even without additives. (Stapinski-IPC)
W74-03554

POWER INPUT FOR THE SURFACE AERATOR IN WASTE WATER TREATMENT PLANTS (PRIKON POVRCHOVEHO AERACNIHO MICHADLA PRO CISTENI ODPADNICH VOD),
Vyzkumny Ustav Chemickych Zarizeni, Brno (Czechoslovakia).
P. Seichter.
Chemicky Prumysl, Vol 23, No 2, p 63-69, February 1973. 9 fig, 2 tab, 20 ref.

Descriptors: *Aeration, *Treatment facilities, *Waste water treatment, Energy, *Energy equation, *Power operation and maintenance, Electric power, Reynolds number, Froude number, Flow, Mixing, Turbulence, Equipment, Equations, Mathematics, Mathematical models, Mathematical studies, Specific gravity, Submergence, Density, Viscosity, Shape, Contours.
Identifiers: *Aerators, Euler number, Mixing tanks, Tanks.

The effects of effluent viscosity, aerator depth, and tank shape on aerator power consumption were studied under optimized aeration conditions. Results of the study were used to develop equations expressing the relationships between Euler, Froude, and Reynolds numbers. It is concluded that aerator power demand depends mainly on the depth of immersion and the specific gravity (density) of the effluent being treated. A decrease in density of the air-effluent mixture was reflected in increased Froude numbers. No significant differenc in power consumption was found between rectangular mixing tanks and circular tanks with baffles. The equations developed can be applied to the design of waste water aerators. (Trubacek-IPC)
W74-03555

PH AND THE EFFECTIVENESS OF EFFLUENT PURIFICATION (PH I EFFEKTIVNOST' OCHISTKI STOCHNYKH VOD),
M. B. Berov, L. I. Shmidt, and V. M. Shapchenko.
Bumazhnaya Promyshlennost', No 2, p 6-7, February 1973. 3 fig.

Descriptors: *Waste water treatment, *Coagulation, *Aluminum, *Color, *Hydrogen ion concentration, Effluents, *Pulp wastes, Pulp and paper industry, Flocculation.
Identifiers: Coagulants, Aluminum sulfate, Decoloring, Kraft mills, Precipitation (Chemical), Chemical consumption, Aluminum hydroxide, Aluminum compounds.

Biologically treated kraft mill effluents are usually purified from lignin and suspended solids by coagulation with aluminum hydroxide sol. The Al concentration in the purified effluent is decisive for its potential reuse, e.g., in filtration plants or aeration ponds, because too high concentrations result in flocculation and precipitation of Al hydroxide upon pH adjustment, as well as in chemical losses. The coagulation-stage pH was studied as a function of resulting effluent color and Al content. In the absence of Al, reduction of effluent color to 100 degrees (on the Co-Pt scale) occurred only below pH 3.3; the same effect occurred at pH 3.8 when small amounts of Al sulfate were present. With 20-30 mg/liter of the coagulant (expressed as Al oxide), the color dropped below 100 degrees and was independent of pH below pH 6; still higher amounts of Al sulfate caused no further color reductions. The minimum Al concentration was found between pH 5.9 and 6.3. Taken together, these data indicate that the best pH for minimization of both effluent color and residual Al content should be 5.5-5.8. (Stapinski-IPC)
W74-03556

CLEANUP OF POLLUTED RHINE RIVER WILL COST WESTERN EUROPE BILLIONS.
For primary bibliographic entry see Field 05G.
W74-03637

BIG PLANT WILL TREAT WASTE WITH PURE OXYGEN.

Engineering News-Record, Vol 191, No 8, p 28-31, August 23, 1973. 2 fig, 1 photo.

Descriptors: *Oxygenation, *Sewage treatment, *Aerobic treatment, *Waste water treatment, *New Jersey, Oxygen, Biochemical oxygen demand, Dissolved oxygen, *Aeration.
Identifiers: Pure oxygen aeration, Compression, Biochemical oxygen demand removal, Sayreville (New Jersey).

The nation's first major sewage treatment plant to use a pure oxygen aeration process is slated for construction at Sayreville, New Jersey. Operations are expected to begin by December, 1976. The project is designed for an average flow of 120 mgd and 90% removal of BOD and suspended solids. Average detention time for effluent in the aeration tanks will be 3.6 hours. Comparable BOD removal in an activated sludge process would require about 6 hours. Shorter detention time enables the plant to be smaller. Use of pure oxygen, as opposed to air, which is free, will save capital and operating costs of compression equipment. The heart of the secondary treatment process will be four oxygenation tanks through which sewage will pass. Flow through the plant might be expandable to 160 mgd. The plant is flexible so that some sewage can be sent through only two of the tanks, while other sewage can be treated in the other tanks, allowing for controlled experiments with detention time or other variables. A 400-ton cryogenic oxygen manufacturing plant will supply the new facility. Sludge from the plant will ultimately be dumped in the Atlantic Ocean. (Stein - North Carolina)
W74-03638

INSTRUMENTATION FOR WATER POLLUTION MONITORING,
Honeywell, Inc., Fort Washington, Pa.
C. P. Blakely, and T. K. Thomas.
Environmental Science and Technology, Vol 7, No 11, p 1006-1010, November, 1973. 2 fig, 4 photo.

Descriptors: *Instrumentation, *Water measurement, *Monitoring, *Water pollution control, Gages, Automation, Control systems, Data collections, Sampling, Dissolved oxygen, Water quality control, Waste water treatment.
Identifiers: *Magnetic flowmeter.

Continuous analysis and composite sampling instruments are an integral part of any wastewater treatment scheme. Sampling of water proportional to flow or at few regular intervals may mask peaks and valleys of water quality, since concentrations of wastes in water vary within short times. Problems of deciding whether to buy, rent, or lease monitoring equipment are discussed. When only one or two parameters need to be monitored, it is generally economical to measure them directly, using a submersible sensor nest or individually submersible sensors. Once the water quality problem has been defined, treatment can begin. Activated sludge treatments for organic wastes are discussed. The magnetic flowmeter is probably the most commonly used device for measuring flow and dissolved oxygen, the most important control parameters. These devices are based on Faraday's law of electromagnetic induction. Operative principles of the devices are further explained, as well as technical applications of dissolved oxygen measurements. Treatment of inorganic wastes involves oxidation, reduction, precipitation, or neutralization; treatment processes are explored. Instrumentation needed for the processes is discussed. The current trend in instrumentation technology is toward electronic monitoring and control from a central point. (Stein - North Carolina)
W74-03640

IODINE TREATED ACTIVATED CARBON AND PROCESS OF TREATING CONTAMINATED WATER THEREWITH,
Culligan, Inc., Northbrook, Ill. (Assignee).
E. G. Kreusch, and F. F. Husseini.
U.S. Patent No. 3,772,189, 3 p, 4 ref; Official Gazette of the United States Patent Office, Vol 916, No 2, p 663, November 13, 1973.

Descriptors: *Patents, *Activated carbon, *Iodine, *Waste water treatment, Pollution abatement, Water quality control, Water pollution control, *Bacteria.
Identifiers: Bacteriostatic carbon bed.

An activated carbon bed is treated with an iodine solution and the iodine is reversibly absorbed by the carbon. The carbon bed is rinsed until the effluent is free of iodine. The rinsed carbon bed is mixed by backwashing to an approximately 50 percent bed expansion to obtain a homogeneous iodine content within the bed. Bacterially contaminated water is passed through the rinsed and mixed carbon bed containing a homogeneous distribution of iodine therein with the carbon releasing the previously absorbed elemental iodine to treat the water and thereby reduce the bacterial content. The iodine solution which is passed through the carbon bed has a normality of between about 0.1 N and about 0.2 N and is passed through the carbon at a rate of between about 0.25 and 1.25 gallons per minute per cubic foot of carbon. (Sinha-OEIS)
W74-03651

METHOD FOR PURIFYING WATER,
Otto Durr K.G., Stuttgart (West Germany) (Assignee).
R. Eisenmann.
U.S. Patent No. 3,772,190, 3 p, 1 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 916, No 2, p 663, November 13, 1973.

Descriptors: *Patents, *Paints, *Electrophoresis, *Foam separation, *Coagulation, *Waste water treatment, Pollution abatement, Water pollution control, Water quality control, Separation techniques.
Identifiers: Enamel.

A method and an apparatus are described for purifying water and more particularly for separating particles of paint, enamel or the like from the wash water of electrophoresis painting apparatus. The polluted water is mixed with air so as to produce a foam, for example, a paint foam, and the foamy mixture is subjected to a separating process in which the paint or other undesired substance is removed from the water. An essential feature consists in subjecting the polluted watery mixture to a first separating stage for partly purifying the water and in then subjecting the outcome of this first stage to a second stage in which the water is again thoroughly mixed with air and frequently recirculated and again separated from the impurities. In the first stage of the process the mixture is mixed and circulated while a coagulant is added, the second stage of the process may be carried out without adding any coagulant. The foam which is produced in the separating process of the second operating stage is supplied to the foam which is produced in the first operating stage by overflowing from one container to another and thereafter the entire foam is removed from the liquid. Even though the new apparatus requires two operating stages, this apparatus may be made of a relatively simple and inexpensive structure. The separating container of the second stage is preferably located at a higher level than that of the first stage and connected by an overflow with the latter. (Sinha-OEIS)
W74-03652

SYSTEM FOR PURIFICATION OF POLLUTED WATER,
Max-Planck-Gesellschaft zur Forderung der Wissenschaften e.V. Goettingen (West Germany). (Assignee).
K. Seidel.
U.S. Patent No. 3,770,623, 6 p, 6 fig, 2 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 916, No 1, p 250, November 6, 1973.

Descriptors: *Patents, *Waste water treatment, Pollution abatement, *Filtration, Aquatic plants, Pathogens, *Sewage treatment, Nitrogen, Nutrients, E. coli, *Enteric bacteria, *Salmonella.
Identifiers: Scripus lacustris, Phragmites communis.

Polluted water is fed into a settling tank. Clear water, containing only colloidal matter, pathogenic organisms, and dissolved materials, is passed into one of two filtration beds each consisting of a bottom layer of a coarse porous material and a top layer of a fine porous material having rooted or growing plants having nodes. A suitable plant is Phragmites communis. Water leaving the filtration beds contains only dissolved material and pathogenic organisms. This water is then passed through an elimination bed containing a layer of porous material such as sand in which a suitable plant such as Scirpus lacustris is rooted. The pollutants serve as nutrients for the plants. Some of the pollutants are eliminated by sustances exuded by these plants. It is pointed out that plants with bacterial nodules kill pathogens such as Escherichia coli, Enterococci, salmonellae etc. The root nodules are nitrogen collectors and contain the ability to produce substances related to streptomycin. This substance is said to kill certain pathogens found in the water. (Sinha-OEIS)
W74-03655

EWAGE TREATMENT APPARATUS AND IETHOD,

J.S. Patent No. 3,772,188, 8 p, 14 fig, 12 fig; Offi-ial Gazette of the United States Patent Office, ol 916, No 2, p 662, November 13, 1973.

)escriptors: *Patents, *Sewage treatment, *Ox-lation, *Sterilization, *Waste water treatment, 'olymers, Equipment, Pollution abatement, 'hosphates, Color, Taste, Phenols, Odor, lydrogen ion concentration.
dentifiers: *Cyanide.

A sewage treatment apparatus is provided to chieve biological and chemical oxidation, terilization, and reduction of undesirable color, aste, odor, phenol, cyanide and phosphate. It omprises an enclosed pressurized vessel which eceives the sewage at its lower portion. High puri-y oxygen is admitted in the upper portion which lso contains a comminutor device. In the upper ortion particle size is reduced thus increasing the urface area available to quickly absorb the ox-gen under pressure to provide rapid oxydation nd ozone sterilization. Inlets are also provided to upply polymers for stimulating reduction of the on-oxidizable substances. The pH is controlled uring various states of the procedure. (Sinha-)EIS)
W74-03656

EWAGE TREATMENT PROCESS,
). F. Othmer.
J.S. Patent No. 3,772,187, 8 p, 1 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 16, No 2, p 662, November 13, 1973.

)escriptors: *Patents, Water pollution control, Waste water treatment, *Sewage treatment, Biochemical Oxygen Demand, *Dissolved ox-gen, Oxidation, Atmospheric pressure, Water uality control, Sedimentation, Pollution abate-nent, *Recycling.

Domestic sewage and other polluted waters may e treated under a pressure of 1/2 to 5 atmospheres tuage or more with dissolved oxygen, or air, to upply the BOD. The oxygen-containing gas is rawn into the suction of a feed and recycle pump vhich agitates the liquid-gas mixture, and in-reases gas solubilization as it is being com-ressed. Simultaneously, any solids which are resent are comminuted in being pumped to the ressure oxidation tank. The higher than at-nospherhic pressure increases oxygen solubility, oncentration, and hence chemical or biochemical eactivity. Thus, a much smaller residence time nd vessel is required, the polluted water is vithdrawn and depressurized to atmospheric pres-ure at which pressure some of the dissolved ox-gen and other gases are released due to lower olubility, and vented. Most of the liquid after lepressurization is recycled to the influent stream or repressurization and additional oxygen dissolu-ion. The recycle may amount to 2 to 50 times, and ome sludge obtained may also be recycled. A vater turbine may recover some of the mechanical nergy used by the pump. The process may be ised by itself or as an adjunct to other processes or treating polluted waters, and also for the oxida-ion of sludge. (Sinha-OEIS)
W74-03657

COMPOST FOR REMOVING OIL FILMS FROM WATER,
International Minerals and Chemical Corp., Libertyville, Ill. (Assignee).
J. P. Harnett.
U.S. Patent No. 3,771,653, 4 p, 4 ref; Official Gazette of the United States Patent Office, Vol 916, No 2, p 535, November 13, 1973.

Descriptors: *Patents, Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Separation techniques, *Absorption, Films.
Identifiers: Oleophilic matter, Hydrophobic matter, *Compost, Aerobiodigestion.

An oil film is removed from the surface of water by contacting the same with a compost prepared by the aerobic digestion of organic waste material. The compost with the absorbed oil floats on the water and can be easily collected to recover the oil. The oil is then separated from the compost, which may then again be used for recovering more oil. Alternatively, the compost is weighted to such a degree that it will sink to the bottom of the water after absorbing oil from the layer of oil on top of the water. The compost materials employed are oleophilic and hydrophobic, so that they will preferentially absorb oil from water. The oils which are absorbed in this process include all oils which are immiscible in water, whether they are of mineral, vegetable or animal origin. Mineral oils that are lighter than water, such as crude oil, gasoline, fuel oil and lubricating oils, are the most common oily contaminants of water and, therefore, the most likely to be recovered. (Sinha-OEIS)
W74-03658

WATER CIRCULATION SYSTEM FOR FRESH WATER FISH HUSBANDRY,
Marine Protein Corp., New York. (Assignee).
W. A. Doherty.
U.S. Patent No. 3,771,492, 4 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 916, No 2, p 494, November 13, 1973.

Descriptors: Freshwater fish, *Waste water treatment, Water quality control, *Ammonia, Water pollution control, *Filtration, Pollution abatement, Oxidation lagoons, Water reuse, *Fish farming, *Recharge ponds.
Identifiers: Fish husbandry, *Metabolites.

A system is described in which a local, natural water table is employed as the source of water used in the fish husbandry operation. A plurality of wells or springs are employed to tap the water and to bring it to the surface for access in the tanks and/or raceways in which the fish are being raised. The water which is passed through a series of tanks and/or raceways, is treated by having at least oxygen and feed added. As the water picks up metabolites, including ammonia, thrown off by the fish it becomes sufficiently polluted so that it can no longer be used for the economic raising of fish. This water is then filtered to remove the solid particles or offal component of the metabolites. The filtered water is then put into a large settling pond which is lined with oyster shells. As the water sits in the settling pond, a large proportion of the ammonia escapes into the atmosphere. Additionally sunlight causes breakdown of some of the ammonium compounds releasing ammonia which also escapes. Both effects reduce the amount of dissolved ammonium products to an acceptably low level. The water then gradually passes through the layer of oyster shells and into the earth around and below the settling pond. As the water passes through the earth it becomes further purified and returns to the water table. At the water table, the water's temperature returns to that of the water table, which is the water temperature for which the site was selected in the first place and is a temperature at which the particular species of fish involved will have close to optimum growth. (Sinha-OEIS)
W74-03659

METHOD OF TREATING OIL-CONTAINING CONTAMINATED DRAINAGE,
Nippon Oil Co. Ltd., Tokyo. (Assignee).
J. Yamamoto, K. Minakawa, H. Nishikado, and S. Imon.
U.S. Patent No. 3,770,628, 5 p, 2 fig, 6 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 916, No 1, p251, November 6, 1973.

Descriptors: *Patents, *Oil pollution, Drainage, *Filtration, *Activated carbon, Pollution abatement, *Waste water treatment.
Identifiers: Wax.

The treatment of oil-containing contaminated drainage is carried out by use of a combination of processes selected from (a) a wax-filled bed-an active carbon bed process, (b) a sandfilter-a wax-filled bed process, and (c) a sandfilter-a wax-filled bed-an active carbon bed process. Nine examples illustrate the use of the various combination of processes. The intimate contact of oil-containing drainage with wax in a vessel filled with wax results in highly effective adsorption of the oil content on the wax even if oil particles are very fine. A high coalescing capability enables effective separation and removal of the oil content by settlement. In the removal of most of the oil content with wax and of the remaining substances with active carbon, the amount of phenol at adsorption equilibrium is increased from one and a half times to twice as much as the initial when the ratio of oil to active carbon is 20-30 ppm. Placement of a sandfilter to remove substances before they enter the waxed area preserves the adsorbing capacity of the wax. (Sinha-OEIS)
W74-03660

FILTRATION SYSTEM FOR LIQUIDS,
Coleco Industries, Inc., Hartford, Conn. (assignee).
For primary bibliographic entry see Field 05F.
W74-03662

METHOD OF SEPARATING METALS FROM WASTE WATER,
Mitsui Mining and Smelting Co. Ltd., Tokyo (Japan). (assignee).
M. Ichiki, and M. Ishii.
U.S. Patent No. 3,766,035, 3 p, 6 ref; Official Gazette of the United States Patent Office, Vol 915, No 3, p 1021, October 16, 1973.

Descriptors: *Patents, *Waste water treatment, *Metals, Cadmium, Zinc, Lead, Copper, Nickel, Iron, Chromium, Manganese, Mercury, Aluminum, Pollution abatement, *Separation techniques, Ions, *Surfactants, *Emulsifiers.

The electrolytic purification of waste water containing metal ions is accomplished by adding an organic solvent and a nonionic surface active agent capable of emulsifying the solvent to the waste water. A portion of 1 to 50 grams of organic solvent per one cubic meter of waste water is used. The organic solvent may be selected from the group consisting of toluene, xylene, mineral spirit and solvent naphtha. The nonionic surface active agent may be selected from the group polyoxyethylene alkyl ether, polyoxyethylene phenol ether, polyoxyethylene sorbitan fatty acid ester, polyoxyethylene acylester, sorbitan fatty acid ester, oxyethylene-oxypropylene block polymer, and fatty acid monoglyceride. (Sinha - OEIS)
W74-03664

PHOSPHOROUS REMOVAL FROM WASTE-WATER,
Union Carbide Corp., New York. (assignee).
M. J. Stankewich, Jr.
U.S. Patent No 3,764,524, 15 p, 2 fig, 2 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 638, October 9, 1973.

Descriptors: *Patents, *Phosphorous, *Carbon, *Aeration, Activated sludge, Biochemical oxygen demand, Nitrogen, *Waste water treatment, Chemical precipitation, *Oxidation.
Identifiers: Ferric chloride, Aluminum sulfate.

A method is described for removing both carbon food and phosphorous pollutant by biochemical oxidation and chemical precipitation using oxygen gas in the presence of activated sludge. Most of

the carbon food and pollutant are removed in a first covered zone with the addition of phosphorous-precipitating compound and under high food-to-biomass ratio. The effluent is further purified in a second covered zone under low food-to-biomass ratio. (Sinha - OEIS)
W74-03667

HYPERBOLIC CROSS FLOW COOLING TOWER WITH BASINS AND FILL INTEGRATED INTO SHELL,
Marley Co., Kansas City, Mo. (assignee).
H. E. Fordyce.
U.S. Patent No 3,764,121, 6 p, 7 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 547, October 9, 1973.

Descriptors: *Waste water treatment, *Patents, *Cooling towers, Water cooling, *Thermal pollution, Heated water, Pollution abatement, Equipment, Water pollution control.

A fireproof, hyperbolic, natural draft, crossflow water cooling tower is described. It has a two story fill assembly structure between respective concrete hot water distribution and cold water basins within the tower shell and integral with the air inlets of the shell. Stainless steel fill and eliminator supports suspended from the distribution and basin units carry transversely three-quarter wave asbestos cement board fill members and transversely full wave eliminator bars respectively cut from corrugated sheets. The fill members are placed on edge with the longitudinal length parallel to the air flow through each fill assembly structure while the eliminator bars lie in flat, generally horizontal disposition with the longitudinal axes slightly tilted for drainage of the bars and located perpendicular to the path of travel of air through respective fill assembly structures. (Sinha - OEIS)
W74-03668

METHOD OF DIGESTING AND FURTHER PROCESSING FRESH SEWAGE SLUDGE OR SAPROPEL,
W. Thorn.
U.S. Patent No 3,772,191, 4 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 916, No 2, p 663, November 13, 1973.

Descriptors: *Waste water treatment, *Patents, *Sewage treatment, *Sludges, *Filtration, Calcium hydroxide, Pollution abatement, Water pollution control, Water quality control, Hydrogen ion concentration.
Identifiers: *Sapropel, Acidification, Hydrochloric acid, Calcium oxide.

A process of digesting and further processing fresh sludge and/or sapropel is characterized by acidifying the pumpable fresh sludge and/or sapropel of predominantly biological original in a reaction vessel with mineral acid until the pH value has fallen below 5 and the mixture begins to separate. There follows a fine adjustment of the pH value with fuming hydrochloric acid to the isoelectric ranges of the most high-molecular sludge substances of biological original thereby completely separating the mixture. This is followed by removing the hydrophobic substances which have accumulated in the upper part of the vessel. The precipitated sludge is separated from the supernatant liquid. The sludge is then reacted with calcium hydroxide or calcium oxide and then dehydrated in filter presses. (Sinha - OEIS)
W74-03671

WASTEWATER LAND TREATMENT SITE REGULATION ACT.
For primary bibliographic entry see Field 06E.
W74-03725

SOME TECHNICAL AND ECONOMIC CONCERNS RELATING TO SHIPBOARD POLLUTION ABATEMENT,
Naval Postgraduate School, Monterey, Calif.
C. F. Rowell.
Available from the National Technical Information Service as AD-755 540, $3.00 in paper copy, $1.45 in microfiche. Technical Report NPS-61RW72121A, December 1972. 57 p, 107 ref.

Descriptors: *Pollution abatement, *Ships, Water pollution source, Sanitary engineering, Estimated costs, *Waste water treatment, Waste disposal.

Three shipboard pollution abatement questions are examined. First, treatment systems are evaluated with respect to cost, safety, reliability and size, subject to minimum EPA standards. Limited flush, incineration and biological treatment are feasible, with wet air oxidation considered a researchable method to obtain a future integrated waste disposal system. Limited space and adverse saltwater effects on microorganisms make biological treatment less desirable. The biological effects of Naval oil and waste dumping is also examined. Ocean sewage dumping is not an effective bactericide, although diffusion, sunlight, osmotic shock and predation are beneficial; dumping does not presently seriously affect the ocean's homeostasis. Small oil concentrations have a measurable effect on the diversity of surface dwelling species. Oil-consuming bacteria fare poorly in the open sea. Technological problems are briefly discussed and a short literature review is given. The economic savings of sending waste ashore for treatment is the third question examined. Attention is given to possible adverse affects of seawater on municipal sewerage systems and inhibition of biological activity. Public reaction to this method appears cool, although there are no technical or economic reasons to preclude its feasibility. (Schroeder-Wisconsin)
W74-03743

5E. Ultimate Disposal of Wastes

UNDERGROUND WASTE MANAGEMENT AND ARTIFICIAL RECHARGE, VOLUMES 1 AND 2.
American Association of Petroleum Geologists, Inc., Tulsa, Okla.

Preprints of papers presented at the 2nd International Symposium held at New Orleans, Sept 26-30, 1973: American Association of Petroleum Geologists, Inc., 1973. 931 p.

Descriptors: *Artificial recharge, *Underground waste disposal, *Waste disposal wells, *Conferences, Industrial wastes, Sewage disposal, Brines, Radioactive waste disposal.

In recent years, deep-well disposal has been the subject of much discussion and criticism. Its use is relatively limited considering the wide divergence in chemical composition of wastes. However, if installations are properly conceived, constructed, and operated, and are installed in a suitable geologic setting, they can fulfill a need without creating other problems such as can occur with use of waste-retention basins, incineration, or possibly even sludge disposal. At the least, the deep-well method removes the waste from the biosphere. Because the capacity of potential receiving formations is finite, unrestricted deep-well disposal should not be allowed. Control measures include the awarding of permits and the delineation of factors such as acceptable injection rates and pressures, types of materials used for construction, and tests and monitoring facilities to insure the utility and safety of the installation. (See W74-03223 thru W74-03250) (Knapp-USGS)
W74-03222

DESIGN AND OPERATION OF LAND TREATMENT SYSTEMS FOR MINIMUM CONTAMINATION OF GROUNDWATER,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 05D.
W74-03223

SALINE AQUIFERS--FUTURE STORAGE RESERVOIRS FOR FRESH WATER,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
O. K. Kimbler, R. G. Kazmann, and W. R. Whitehead.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 192-206. 1973. 4 fig, 4 tab, 3 ref.

Descriptors: *Water storage, *Artificial recharge, Aquifers, Hydrogeology, Saline water-freshwater interfaces, Saline water, Aquifer characteristics.
Identifiers: *Saline aquifers.

Some saline aquifers may be useful for freshwater storage. Several model aquifers and approximate mathematical models were studied. The annual cycle of injection, storage, and withdrawal of the freshwater is feasible under the idealized assumptions normally found in groundwater hydrology--a horizontal, isotropic, homogeneous aquifer of uniform porosity, transmissivity, and storativity. Laboratory experiments on a single-well system built into a mini-aquifer constructed of epoxy-consolidated, uniform blasting sand show that the efficiency of the process, per cycle, increases as the number of cycles increases. Storage of freshwater in an aquifer that contains brine is feasible, if a sufficient number of cycles is considered. In a 9-unit well field, although the recovery percentage of the end of the first cycle is smaller than that of a single well operating by itself, the recovery rate of a multi-well configuration increases as the number of cycles increases. (See also W74-03222) (Knapp-USGS)
W74-03224

ARTIFICIAL RECHARGE IN UNITED KINGDOM WITH SPECIAL REFERENCE TO LONDON BASIN,
Water Resources Board, Reading (England).
For primary bibliographic entry see Field 04B.
W74-03225

UNDERGROUND WASTE DISPOSAL AND ARTIFICIAL RECHARGE IN JAPAN,
Tokyo Univ. of Education (Japan). Faculty of Science.
S. Yamamoto.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 60-71. 1973. 4 fig, 5 tab, 4 ref.

Descriptors: *Underground waste disposal, *Waste disposal wells, *Artificial recharge, Injection wells, Alluvium, Industrial wastes, Acids, Land subsidence.
Identifiers: *Japan.

Artificial recharge, which is needed to control problems of land subsidence and saltwater intrusion, is in the experimental stage in Japan. Three sites in Kanazawa, Tsuruga, and Yamagata have successful artificial-recharge wells. These sites are all on similar alluvial-fan deposits, but have quite different injection rates. This difference is attributed to differences in well structure and completion procedure, in particular, performation. Underground waste disposal is practiced with many complex and often dangerous fluid wastes in Japan, but the operations are secret. Two successful injection operations involve disposal of acid waste from a sulfur mine and thermal water from a geothermal electric generating plant. (See also W74-03222) (Knapp-USGS)
W74-03226

SUBSURFACE DISPOSAL OF LIQUID INDUSTRIAL WASTES IN ALABAMA--A CURRENT STATUS REPORT,
Geological Survey, University, Ala.
K. P. Hanby, R. E. Kidd, and P. E. LaMoreaux.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 72-90. 1973. 9 fig, 15 ref.

Descriptors: *Waste disposal wells, *Alabama, *Underground waste disposal, Hydrogeology, Investigations, *Industrial wastes.

Five subsurface disposal wells have been drilled and completed in Alabama. At present in Alabama, subsurface disposal is permissible for some types of wastes if the well is properly designed and completed in an appropriate geologic environment, if conventional methods of waste treatment have been evaluated and proved to be inadequate, and if an adequate monitoring system has been installed. The geology, drilling, completion, and testing techniques involved in these wells are presented as a basis for discussion of decision-making for approval or rejection of the proposed deep-well disposal projects by a regulatory agency. (See also W74-03222) (Knapp-USGS)
W74-03227

EFFECTS OF WASTE PERCOLATION OF GROUNDWATER IN ALLUVIUM NEAR BARSTOW, CALIFORNIA,
Geological Survey, Garden Grove, Calif.
J. L. Hughes, and S. G. Robson.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 91-129, 1973. 12 fig, 1 tab, 18 ref.

Descriptors: *Waste water disposal, *Alluvium, *Path of pollutants, Irrigation water, Percolation, Infiltration, Groundwater movement, Malenclaves, Water pollution sources, *California.
Identifiers: *Barstow (Calif).

Part of the alluvial aquifer along the Mojave River near Barstow, California, has been subjected to pollution from percolation of wastes and sewage from industrial and municipal sources for about 60 years. The pollution has forced the abandonment of several domestic wells because of taste, odor, and foaming, and it threatens the well field serving the U.S. Marine Corps Supply Center. An old plume of degraded water produced by percolation from sewage and waste-disposal facilities near Barstow is moving near the base of the alluvial aquifer. Since 1910 this degraded plume has moved downgradient about 4 mi. A more recent overlying plume of degraded water is located near the downstream edge of the deeper plume. This overlying plume is produced by percolation from sewage-treatment facilities installed in 1968. The gradual increase in concentration of dissolved solids in the U.S. Marine Corps wells results in part from the use of treated sewage effluent on a local golf course. A digital water-quality model of the aquifer aided in evaluating the effects of several alternative groundwater management practices. Model results indicate that by 1991 present sewage-percolation practices would result in dissolved-solids concentrations exceeding 900 mg/liter in the Marine Corps well field. (See also W74-03222) (Knapp-USGS)
W74-03228

ROLE OF BOREHOLE GEOPHYSICS IN UNDERGROUND WASTE STORAGE AND ARTIFICIAL RECHARGE,
Geological Survey, Denver, Colo.
W. S. Keys, and R. F. Brown.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 147-191, 1973. 17 fig, 49 ref.

Descriptors: *Borehole geophysics, *Artificial recharge, *Waste disposal wells, *Injection wells, Electrical well logging, Radioactive well logging, Borehole cameras, Subsurface investigations, Hydrogeology.

Borehole geophysics is being used by the U. S. Geological Survey to study geohydrologic parameters related to recharging the Ogallala Formation on the High Plains of Texas. The optimum utilization of underground space for the emplacement and storage of waste and surface water can be achieved through an understanding of the geohydrologic environment. The emplacement of liquid waste and the artificial recharge of aquifers generally requires the drilling of exploration, injection, and monitoring wells. Some geophysical logs are run on almost all wells drilled for deep disposal. Logs provide data on the location, thickness, and lateral continuity of storage zones and confining beds, amount and distribution of total or effective porosity, and the relative magnitude of permeability. Intergranular and fracture porosity can be discriminated by cross-plotting acoustic-velocity and neutron or gamma-gamma logs. The distribution and orientation of preinjection fractures can be determined by acoustic televiewer logs. Logs provide data on the chemical quality of the native fluids and the mineralogy of the aquifer, which are necessary to predict chemical reactions with injected fluids. The temperature and conductivity of the interstitial fluids may be measured directly and their specific gravity and viscosity may be calculated from log data. After waste injection or artificial recharge has started, logs provide in-situ measurements of changes in the system. (See also W74-03222) (Knapp-USGS)
W74-03229

FEASIBILITY STUDY OF A SEISMIC REFLECTION MONITORING SYSTEM FOR UNDERGROUND WASTE-MATERIAL INJECTION SITES,
Petty-Ray Geophysical Group, San Antonio, Tex.
For primary bibliographic entry see Field 05B.
W74-03230

HYDRAULIC FRACTURING AS A TOOL FOR DISPOSAL OF WASTES IN SHALE,
Geological Survey, Washington, D.C.
R. J. Sun.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 219-270, 1973. 28 fig, 1 tab, 38 ref, append.

Descriptors: *Underground waste disposal, *Injection wells, *Waste disposal wells, *Grouting, *Shales, Borehole geophysics, Electrical well logging, Radioactive well logging.

The injection of wastes mixed with cement grout into thick shale formations is a promising method for effective immobilization of toxic wastes in a nearly impermeable medium. Hydraulic fracturing provides openings in the shale during the grout injection. To retain certain types of wastes better, ion-exchange and adsorption agents can be added to the grout when it is mixed. After solidification of the grout, the injected wastes will become an integral part of the shale and remain there as long as the shale is not subject to erosion. In bedded shale there is a great difference in tensile strength between the direction normal to and the direction parallel with bedding planes. This difference in tensile strength may favor the formation of hydraulically induced fractures along beddding planes within a zone of limited vertical extent. Before construction of a waste-disposal facility it is necessary to test the site by injecting water or nontoxic grout tagged with radioactive tracer to judge whether a zone of fractures can be induced parallel with the shale bedding planes. Injection pressure, pressure decay, movement of the ground surface, and gamma-ray logs of observation wells may be used to interpret the orientation of the hydraulically induced fractures during the site-selection tests. A case history of hydraulic fracturing at West Valley, New York, illustrates the method of evaluating a site. Waste disposal through an injection well should be conducted in multiple-layer injection stages. The first injection starts at the greatest depth, then the injection zone is plugged off by cement, and the second injection is started at a suitable distance above the first one. (See also W74-03222) (Knapp-USGS)
W74-03231

SHORT-TERM EFFECT OF INJECTION OF TERTIARY-TREATED SEWAGE ON IRON CONCENTRATION OF WATER IN MAGOTHY AQUIFER, BAY PARK, NEW YORK,
Geological Survey, Mineola, N.Y.
For primary bibliographic entry see Field 05C.
W74-03232

RADIOACTIVE- AND CHEMICAL-WASTE TRANSPORT IN GROUNDWATER AT NATIONAL REACTOR TESTING STATION, IDAHO: 20-YEAR CASE HISTORY AND DIGITAL MODEL,
Geological Survey, Idaho Falls, Idaho.
For primary bibliographic entry see Field 05B.
W74-03233

MODIFICATION OF ARTIFICIALLY RECHARGED WATER IN SWITZERLAND,
For primary bibliographic entry see Field 05B.
W74-03234

HYDRODYNAMICS OF MOUNT SIMON SANDSTONE, OHIO AND ADJOINING AREAS,
Geological Survey, Columbus, Ohio.
For primary bibliographic entry see Field 05B.
W74-03235

DEDUCTION OF FLOW PATTERNS IN VARIABLE-DENSITY AQUIFERS FROM PRESSURE AND WATER-LEVEL OBSERVATIONS,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 04B.
W74-03236

UNDERGROUND STORAGE AND RETRIEVAL OF FRESH WATER FROM A BRACKISH--WATER AQUIFER,
Geological Survey, Norfolk, Va.
For primary bibliographic entry see Field 04B.
W74-03237

RETENTION OF DISSOLVED CONSTITUENTS OF WASTE BY GEOLOGIC MEMBRANES,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 05B.
W74-03238

HYDROGEOLOGIC STUDIES AT A SUBSURFACE RADIOACTIVE-WASTE-MANAGEMENT SITE IN WEST-CENTRAL CANADA,
Waterloo Univ. (Ontario). Dept. of Earth Sciences.
J. A. Cherry, G. E. Grisak, and W. E. Clister.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 436-467, 1973. 11 fig, 3 tab, 28 ref.

Descriptors: *Underground waste disposal, *Radioactive wastes, *Canada, *Groundwater movement, *Hydrogeology, *Path of pollutants, Sorption.

One of Canada's two main subsurface radioactive-waste-management sites is located at the Whiteshell Nuclear Research Establishment in southeastern Manitoba. The area receives low-, medium-, and high-level solid wastes and small amounts of liquid waste. The wastes are buried at depths as great as 15 ft below ground surface and are below the water table, which is normally within a few feet of the ground surface. No significant groundwater contamination has occurred since use began in 1964. The waste-management

operations are carried out in deposits of Pleistocene clay and clay-loam till. The deposits have significant secondary hydraulic conductivity resulting from numerous fractures. Because of high hydraulic head in a sandy deposit below the burial zone, the direction of natural groundwater flow is upward through the till and clay into the water-table zone. The groundwater flow system will localize the contaminants in or near the soil zone. Monitoring and removal, if necessary, would be relatively simple. In the unlikely event of leakage of liquid wastes into the groundwater zone, the natural groundwater flow system will minimize the hazard by localizing the contamination at shallow depths in th waste-management area or by transporting the radionuclides at very slow rates in an underlying sandy deposit. Contaminants in the sand could be effectively controlled or removed by a combination of natural sorption processes and well pumping. (See also W74-03222) (Knapp-USGS)
W74-03239

MOVEMENT AND ACCUMULATION OF SUSPENDED SEDIMENT DURING BASIN RECHARGE,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 04B.
W74-03240

GEOHYDROLOGY OF BURIED TRIASSIC BASIN AT SAVANNAH RIVER PLANT, SOUTH CAROLINA,
Du Pont De Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
I. W. Marine.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 481-504, 1973. 4 tab, 32 ref. USAEC Contract AT (07-2)-1.

Descriptors: *Hydrogeology, *Underground waste disposal, *South Carolina, *Radioactive waste disposal, Radioactive wastes, Groundwater basins, Water levels.

At the Savannah River Plant near Aiken, South Carolina, high-level radioactive wastes are stored in concrete and steel tanks buried just beneath and ground surface. This waste is of such activity and longevity that it cannot be dispersed into the environment, but it must be contained for periods of time extending at least into hundreds and perhaps thousands of years. One concept for the terminal containment of this waste is to store it in excavated chambers within the bedrock, which is covered by about 1,000 ft of coastal-plain sedimentary beds at the plant site. A buried Triassic basin that might have potential for waste storage was discovered beneath the southern third of the plant site. Seismic, gravity, and magnetic surveys, and the drilling of several exploratory wells, indicate that the Triassic basin is about 30 mi long, 6 mi or more wide, and filled with sedimentary rocks 5,300 ft thick. The rock in the basin is predominantly mudstone of very low permeability, but a few lenses of poorly sorted gritty sandstone are present. The water yield of all the exploratory wells is extremely low, and water-transmitting fractures are virtually nonexistent. In two wells within the basin, heads above land surface have been measured that cannot be explained by connection with a recharge area. Possible explanations are tectonic compression, temperature increase, and osmotic-membrane phenomena. (See also E74-03222) (Knapp-USGS)
W74-03241

ARTIFICIAL RECHARGE OF TREATED WASTE WATERS AND RAINFALL RUNOFF INTO DEEP SALINE AQUIFERS OF PENINSULA OF FLORIDA,
Black, Crow and Eidsness, Inc., Gainesville, Fla.
J. I. Gracia-Bengochea, C. R. Sproul, R. O. Vernon, and H. J. Woodard.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 505-525, 1973. 7 fig, 2 tab, 18 ref.

Descriptors: *Waste disposal wells, *Florida, *Hydrogeology, Underground waste disposal, Artifical recharge, Injection wells, Waste water disposal.
Identifiers: Saline aquifers.

Deep-well disposal of waste waters into deep saline aquifers, after secondary biological treatment and disinfection, is feasible (1) if an aquifer exists that can accept treated waste waters without significant changes in its hydraulic and structural characteristics, and (2) if use of the water in that aquifer, in adjacent ones, or from surficial sources is not impaired. The peninsula of Florida, at the southeastern extremity of the continental United States, is underlain by several thousand feet of carbonate rock and only minor amounts of siliceous clastic units. Cavernous limestone and dolomite aquifers at relatively shallow depths constitute the principal sources of freshwater in the area. Deeper cavernous zones, separated from the freshwater zones by practically impermeable limestone and dolomite, are uniquely suited for receiving injected fluids. (See also W74-03222) (Knapp-USGS)
W74-03242

INJECTION OF ACIDIC INDUSTRIAL WASTE INOT A SALINE CARBONATE AQUIFER: GEOCHEMICAL ASPECTS,
Geological Survey, Tallahassee, Fla.
M. I. Kaufman, D. A. Goolsby, and G. L. Faulkner.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 526-551, 1973. 10 fig, 5 tab, 13 ref.

Descriptors: *Waste disposal wells, *Water chemistry, *Florida, Acidity, Sugarcane, Underground waste disposal, *Injection wells, Oxygen demand, Path of pollutants, Water pollution effects, Carbonate rocks, Industrial wastes.
Identifiers: *Saline aquifers.

A section of carbonate rocks that includes several highly permeable cavernous zones filled with saline water underlies the south part of peninsular Florida at depths from about 1,500 to 4,500 ft. Because these cavernous zones are capable of yielding or accepting large quantities of fluids, they are used for storage of industrial and municipal liquid waste at several places. One such place is at the south end of Lake Okeechobee, near Belle Glade, Florida, where the effluent from a sugar mill and liquid waste from the production of furfural processed from sugar cane bagasse have been injected at depths between about 1,500 and 2,200 ft. The waste ranges in temperature from 71 to 103 deg C and in pH from 2.6 to 4.5; it is highly organic (chemical oxygen demand, 6.000-26,000 mg/liter). Injection rates range from 400 to 800 gal/minute at pressures of 30-60 lb per sq in. Anaerobic degradation of the organic waste begins near the injection well as indicated by the presence of hydrogen sulfide, methane, carbon dioxide, and nitrogen. The waste has moved both upward and laterally in the aquifer system. When upward movement of waste was detected, injection was discontinued and the well was drilled and cased several hundred feet deeper. (See also W74-03222) (Knapp-USGS)
W74-03243

HYDROLOGIC EVALUATION OF INDUSTRIAL-WASTE INJECTION AT MULBERRY, FLORIDA,
Geological Survey, Tampa, Fla.
W. E. Wilson, J. S. Rosenshein, and J. Hunn.
In: Under ground Waste Management and Artificial Recharge, Vol 1, p 552-564, 1973. 4 fig, 1 tab, 11 ref.

Descriptors: *Waste disposal wells, Acids, *Chemical wastes, Limestones, *Hydrogeology, *Florida, Industrial wastes, Aquifer characteristics, *Injection wells.

Florida's deepest waste-injection well, completed in 1972 at a chemical plant at Mulberry, injects acid industrial waste into carbonate rock. The liquid waste has a high chloride content and a pH that is generally less than 2, and at times less than 1. The injection-well annulus has two monitor wells, one open near the base of the Floridan aquifer from 1,254 to 1,264 ft, and the other open to the saline-water aquifer below the Floridan aquifer, from 2,755 to 2,788 ft. Several permeable zones are exposed in the open hole. Dissolution of limestone by the low-pH waste substantially increased the permeability of the rock adjacent to the well bore and increased the density and temperature of the injection fluid as it moved into the injection zone. Injection-zone transmissivity is less than 800 sq ft per day. (See also W74-03222) (Knapp-USGS)
W74-03244

CASE HISTORY OF SUBSURFACE WASTE INJECTION OF AN INDUSTRIAL ORGANIC WASTE,
Geological Survey, Denver, Colo.
J. A. Leenheer, and R. L. Malcolm.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 565-584, 1973. 5 fig, 5 tab, 6 ref.

Descriptors: *Waste disposal wells, Water chemistry, *Acids, *Underground waste disposal, *Industrial wastes, *Industrial wastes, *North Carolina, Biochemistry, Chemical reactions, Iron, Carbon dioxide, Limestones, *Organic wastes, Injection wells.

From May 1968 to December 1972, an industrial organic waste was injected at rates of 100-200 gal per minute into an Upper Cretaceous sandstone, gravel, and limestone aquifer near Wilmington, North Carolina. The waste, an aqueous solution of formic, acetic, and phthalic acids, interacted with the aquifer to dissolve carbonate, aluminosilicate, and iron-containing minerals, and to produce carbon dioxide, methane, and hydrogen sulfide gases. Water samples obtained from four observation wells that penetrate the aquifer near the injection well show a 3-fold increase in silica, a 5-fold increase in iron, and a 28-fold increase in aluminum over background data, indicating dissolution of minerals. Gas that effervesced from these water samples contained up to 85% carbon dioxide by volume. Water samples obtained from a observation well 1,500 ft north of the original injection wells gave evidence for biochemical waste transformations during passage of the waste front. Gas that effervesced from these water samples contained up to 54% methane by volume. Ferrous iron concentrations as high as 35 mg per liter, hydrogene sulfide gas, and sulfide precipitates were additional indicators of biochemical reductive processes. (See also W74-03222) (Knapp-USGS)
W74-03245

ROLE OF BACTERIA IN DECOMPOSITION OF INJECTED LIQUID WASTE AT WILMINGTON, NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W74-03246

HISTORY OF A TWO-WELL INDUSTRIAL--WASTE DISPOSAL SYSTEM,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
E. C. Donaldson, and R. T. Johansen.

In: Underground Waste Management and Artificial Recharge, Vol 1, p 603-621, 1973. 8 fig, 3 tab, 2 ref.

Descriptors: *Waste disposal wells, *Injection wells, *Underground waste disposal, *Industrial wastes, Organic compounds, Organic wastes.
Identifiers: *Two-well waste injection.

A two-well waste injection system has been in operation since 1964. The major constituents of the wastes are phenol, 1-butanol, butanal, and n-hexylamine. The advance of the waste constituents is retarded by adsorption; thus, at the advancing front a zone develops that is depleted of waste constituents. The depth of this zone increases as more of the formation is invaded by the injected fluid. Injection of the industrial wastes in the two-well system solved a very difficult waste-disposal problem. The two noncompatible wastes are handled with a minimum of surface treatment by using a two-well system. (See also W74-03222) (Knapp-USGS)
W74-03247

SUBSURFACE DISPOSAL OF WASTE IN KANSAS,
Kansas State Dept. of Health, Topeka.
B. F. Latta.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 622-633, 1973. 1 fig, 1 tab.

Descriptors: *Waste disposal wells, *Kansas, Regulation, *Industrial wastes, Oil fields, Brines, *Underground waste disposal, *Injection wells.

The use of wells for the subsurface disposal of wastes has been practiced in Kansas since 1935. All of the early waste-disposal wells were used to dispose of oil-field brine. Permits for the first industrial-waste disposal wells other than oil-field wells were issued in 1952. Before using a well for the subsurface disposal of oil-field or gas-field brines, the operator must submit plans and specifications for each disposal well to the Kansas State Corporation Commission. Before using a well for the subsurface disposal of industrial wastes other than oil-field or gas-field wastes, an application must be filed with, and a permit issued by, the Kansas State Department of Health. At present, there are 3,200 approved oil-field and gas-field saltwater-disposal wells in use, receiving a total of about 3.5 million bbl of salt water per day. There are 30 industrial-waste disposal wells at 20 plants in the state which include 10 LPG underground-storage projects, two salt companies, two petroleum refineries, four natural-gas compressor stations, one chemical-manufacturing plant, and one fertilizer plant. Most industrial waste being disposed of in the subsurface consists of salt brine. Experience with both industrial and oil-field disposal wells shows that most operational problems are caused by (1) selection of an injection zone with inadequate permeability, (2) lack of preliminary waste treatment or inadequate treatment, or (3) failure to provide an effective maintenance program. (See also W74-03222) (Knapp-USGS)
W74-03248

SITE INVESTIGATIONS FOR A BEDDED-SALT PILOT PLANT IN PERMIAN BASIN,
Oak Ridge National Lab., Tenn.
T. F. Lomenick, and A. L. Boch.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 634-651, 1973. 12 fig, 1 tab, 11 ref.

Descriptors: *Underground waste disposal, *Radioactive waste disposal, *Nuclear wastes, *Aquicludes, *Kansas, Hydrogeology, Salts, Groundewater movement, *New Mexico.
Identifiers: *Salt mines, Bedded salt, Rock salt.

High-level radioactive waste contains long-lived nuclides that require complete confinement for long periods of geologic time. Rock salt is the preferred geologic medium for the ultimate disposal of these wastes as its unique self-healing properties make it impervious to the circulation of groundwaters. Site studies were made in the Permian basin and, in particular, in central Kansas and in a large tract of federally owned land in southeastern New Mexico. A series of coreholes was drilled to provide data for selecting disposal levels and for assessing the hydraulic characteristics of the overlaying formations. Measurements of the physical properties of these rocks were made to calculate their deformational behavior. The Permian basin should continue to be tectonically stable for the next few hundreds of thousands of years or for the effective lifetime of the wastes. Present rates of denudation in central Kansas average less than 1 ft per 1,000 years and stream incisions in the same area during Quaternary time have not exceeded several hundred feet. The buried wastes would not be adversely affected by the advance of a new continental ice sheet. (See also W74-03222) (Knapp-USGS)
W74-03249

DEEP-WELL INJECTION OF DESALTING--PLANT WASTE BRINE,
Illinois State Water Survey, Urbana.
R. J. Schicht.
In: Underground Waste Management and Artificial Recharge, Vol 1, p 652-657, 1973. 6 ref.

Descriptors: *Waste disposal wells, *Brines, *Desalination wastes, *Illinois, Hydrogeology, Injection wells, Path of pollutants, *Sandstones.
Identifiers: Mount Simon Sandstone.

Desalting of saline waters stored in a deep artesian aquifer in northeastern Illinois (the Mount Simon Sandstone) is being considered. It would be necessary to dispose of large quantities of desalting-plant waste brine. Evaluation of brine-disposal methods led to selection of disposal by injection through wells open to the lower Mount Simon aquifer. Injection-well fields were designed to eliminate contamination of feedwater and to keep injection pressures within acceptable limits. Wells were designed to be capable of injecting 1 million gal per day. Injection costs range from 17 cents per 1,000 gal for injection of brine from a 1-mgd reverse-osmosis plant to 35 cents per 1,000 gal for brine from a 5-mgd distillation plant. Waste-brine injection may have a harmful effect on the quality of water withdrawn from existing wells open to the aquifers above the Mount Simon (See alsw W74-03222) (Knapp-USGS)
W74-03250

EFFECT OF FORMATION DIP ON THE MOVEMENT OF FRESH WATER STORED IN SALINE AQUIFERS,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 04B.
W74-03336

ARTIFICIAL RECHARGE--STATE OF THE ART,
Geological Survey, Lubbock, Tex.
For primary bibliographic entry see Field 04B.
W74-03354

INDUSTRIAL WASTEWATER-INJECTION WELLS IN UNITED STATES--STATUS OF USE AND REGULATION, 1973,
Missouri Univ., Rolla. Dept. of Geological Engineering.
D. L. Warner, and D. H. Orcutt.
In: Underground Waste Management and Artificial Recharge, Vol 2, p 687-697, 1973. 8 tab, 5 ref.

Descriptors: *Waste disposal wells, *Injection wells, *Regulation, *Underground waste disposal, *Reviews, Legislation, Water law, Hydrogeology, Path of pollutants, Water pollution effects, *United States.

As of mid-1973, at least 278 industrial wastewater-injection wells had been constructed in 24 states, and 170 of these wells were operating. The chemical industry is the largest user of injection wells. The total depth of existing wells ranges from less than 1,000 ft to over 12,000 ft, but most are between 1,000 and 6,000 ft deep. Ninety-five percent of existing wells have average injection rates of less than 400 gpm and 99% inject at average well-head pressures of less than 1,500 psi. Ninteey-six percent of existing wells are completed in unconsolidated sand, sandstone, or carbonate zones, which range in age from Cambrian to Quaternary. There are few instances of reported contamination of fresh groundwater and no reported instances of degradation of other resources. A few states have developed specific laws and regulations for dealing with wastewater injection. Some recommended policies, laws, and procedures have been developed at the Federal and Interstate level. (See also W74-03222) (Knapp-USGS)
W74-03355

ARTIFICIAL RECHARGE OF COASTAL-PLAIN AQUIFER IN ISRAEL,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Div. of Hydrology.
For primary bibliographic entry see Field 04B.
W74-03356

HAZARDS OF WASTE DISPOSAL IN GROUND-WATER BASINS,
Geological Survey, Sacramento, Calif.
B. E. Lofgren.
In: Underground Waste Management and Artificial Recharge, Vol 2, p 715-728, 1973. 4 fig, 9 ref.

Descriptors: *Underground waste disposal, *Hydrogeology, Aquifers, Aquicludes, Aquifer characteristics, Radioactive waste disposal, Industrial wastes, Path of pollutants, Water pollution effects, Water pollution sources.

Isolated zones in groundwater basins are being considered as burial grounds for hazardous wastes. Unconsolidated deposits, even at great depth, are highly sensitive to changes in applied stress. Interstitial fluids may be squeezed from even relatively impermeable beds by modest stress changes. Hydraulic stresses in a developing groundwater basin may affect beds considerably below the deepest pumping wells. Theoretically, seepage stresses, and thereby groundwater movement, ultimately would affect all beds down to basement or some underlying truly impermeable layer. Slow drainage from each interbed continues as long as excess pore pressure exists in that interbed. Injection of wastes into clay or shale interbeds would cause a sharp increase in pore pressure in these interbeds. Depleted artesian aquifers are not empty reservoirs ready for refilling. Rather, the groundwater systems are fully saturated and are adjusting to the various stresses imposed on the basin. Horizontal and vertical ground movement, caused by horizontal and vertical groundwater flow, can be a serious threat to surface or buried structures. Saline-water bodies in a basin are not necessarily permanently isolated from the freshwater circulation system. Evidence suggests that upward seepage stresses sometimes extend below the freshwater-saline water interface; thus, in some areas saline water may be moving upward into the freshwater zones. Few regions of a groundwater basin are isolated from the circulating flow system. Long-lived radioactive wastes require isolation from the hydrosphere for periods of time ranging from 1,000 to several hundreds of thousands of years, and some waste materials must be contained forever. (See also W74-03222) (Knapp-USGS)

W74-03357

ASSE SALT MINE, FEDERAL REPUBLIC OF GERMANY--OPERATING FACILITY FOR UNDERGROUND DISPOSAL OF RADIOACTIVE WASTES,
Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Neuherberg bei Munich West Germany. Institut fuer Stratigraphie.
K. Kuhn.
In: Underground Waste Management and Artificial Recharge, Vol 2, p 741-766, 1973. 6 fig, 3 tab, 22 ref.

Descriptors: Underground waste disposal, Radioactive waste disposal, Salts, Mining, Hydrogeology, Monitoring.
Identifiers: Rock salt, Salt mines, Germany (Federal Republic).

All investigations for the disposal of radioactive wastes originating from the different nuclear activities in Germany, mainly nuclear research and power production, were intended to find a place where the wastes are excluded from the biosphere for the time necessary for their decay; therefore, research and development work was concentrated on salt formations. Because the salt deposit in the Asse mine is in the form of an anticline, a total of about 130 rooms was created on 13 different levels by a special type of room-and-pillar mining system. Test disposal of low-level radioactive wastes was started in April 1967. Solid or solidified wastes, packed in 200-liter drums, are stacked in the rooms. Those rooms filled with low-level wastes are sealed off. At present a total of about 22,000 drums has been disposed of. In August 1972, disposal of intermediate-level radioactive wastes was started. The environment of the mine is thoroughly monitored. Total capital investments amount to about 18 million Deutsche mark to date. Operating costs are about 2 million Deutsche mark a year, including staff and scientific personnel. (See also W74-03222) (Knapp-USGS)
W74-03358

DAN REGION, ISRAEL, SEWAGE-RECLAMATION AND RECHARGE PROJECT,
Tahal Consulting Engineers Ltd., Tel Aviv (Israel). Div. of Hydrology.
For primary bibliographic entry see Field 05D.
W74-03359

LABORATORY FACILITY FOR STUDIES RELATED TO ARTIFICIAL RECHARGE,
Geological Survey, Lubbock, Tex.
For primary bibliographic entry see Field 04B.
W74-03360

HYDROGEOLOGY OF SUBSURFACE LIQUID--WASTE STORAGE IN FLORIDA,
Geological Survey, Tallahassee, Fla.
H. S. Puri, G. L. Faulkner, and G. O. Winston.
In: Underground Waste Management and Artificial Recharge, Vol 2, p 825-850, 1973. 11 fig, 14 ref.

Descriptors: *Underground waste disposal, *Florida, *Hydrogeology, *Waste disposal wells, Karst, Stratigraphy, Injection wells, Aquicludes, Industrial wastes, Sewage disposal, Limestones, Aquifer characteristics, *Liquid wastes.

Liquid wastes are being injected into deep, saline, carbonate aquifers in Florida. The wastes, including acidic, high-oxygen-demand industrial-plant effluents, are injected into permeable saline zones separated from shallower freshwater aquifers by confining layers. At a site near Pensacola, in west Florida, acidic liquid waste has, for nearly 10 years, been injected into a 1,400- to 1,700-ft deep, moderately permeable carbonate zone separated from shallower freshwater aquifers by a widespread, 200-ft thick, nonpermeable, plastic clay. The pressure effects of this injection now extend outward more than 30 mi. The waste has improved the permeability of the injection zone near the injection well by dissolution of the limestone. There is no evidence that either the confining layer or the overlying carbonate aquifer has been adversely affected by the injection. In the south part of peninsular Florida, the aquifer used for waste storage consists almost entirely of carbonate rocks, in part anhydritic. Secondary sewage-plant effluent has been injected for about 2 years into a highly cavernous limestone at a depth of about 3,000 ft in the Miami area with only a slight bottom-hole pressure increase. Neither the quality of the water nor the pressure in the overlying permeable zones has been affected. Hot acidic waste injected at a depth of about 1,500 ft in northwestern Palm Beach County migrated upward to a shallower permeable zone. The injection well was subsequently drilled deeper and cased to about 2,000 ft to confine the waste to the injection zone. (See also W74-03222) (Knapp-USGS)
W74-03361

FEASIBILITY STUDY OF LIQUID-WASTE INJECTION INTO AQUIFERS CONTAINING SALT WATER, WILMINGTON, NORTH CAROLINA,
North Carolina Dept. of Natural and Economic Resources, Wilmington. Office of Water and Air Resources.
H. M. Peek, and R. C. Heath.
In: Underground Waste Management and Artificial Recharge, Vol 2, p 851-875, 1973. 12 fig, 1 tab, 5 ref.

Descriptors: *Waste disposal wells, *Underground waste disposal, *Hydrogeology, *North Carolina, Industrial wastes, Monitoring, Waste treatment, Waste water treatment, Waste water disposal, *Liquid wastes.
Identifiers: Wilmington (NC).

An experimental system to inject liquid waste into relatively shallow sedimentary aquifers containing saltwater was installed at Wilmington, North Carolina, and placed in operation in the spring of 1968. The initial system consisted of one injection well and three observation wells completed between depths of 850 and 1,050 ft, and one observation well completed in the next higher aquifer at a depth of about 700 ft. Injecting the byproduct from dimethyl terephthalate at the rate of about 300,000 gal per day, the initial system of wells failed because of construction and operational problems in addition to hydrogeologic conditions unfavorable to injection. A new injection well was installed in operation in January 1971, along with part of a new monitor-well system. Because of the unfavorable hydrologic conditions and the failure of some wells which permitted leakage into overlying aquifers a conventional waste-treatment facility was constructed to replace the injection system in 1972, and injection of waste ceased in November 1972. About 20-90 gpm of water was injected until the end of March 1973, when the system became inactive except for monitoring. (See also W74-03222) (Knapp-USGS)
W74-03362

HYDROGEOLOGIC CONSIDERATIONS IN LAND SPREADING OF SEWAGE TREATMENT-PLANT EFFLUENT IN CENTRAL FLORIDA,
Geological Survey, Winter Park, Fla. Water Resources Div.
For primary bibliographic entry see Field 05D.
W74-03518

RENOVATING SEWAGE EFFLUENT BY GROUND WATER RECHARGE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 05D.
W74-03520

ENGINEERING DESIGN CRITERIA FOR SPRAY IRRIGATION,
Bishop (William), Tallahassee, Fla.
For primary bibliographic entry see Field 05D.
W74-03521

5F. Water Treatment and Quality Alteration

LOOK, NO CLARIFIER,
Mississippi Power and Light Co., Vicksburg.
J. E. Burguet, and M. R. Hutson.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 87-98, 1973. 2 fig, 3 tab, 3 ref.

Descriptors: *Water quality control, *Electric powerplants, *Boilers, *Turbines, *Filters, Economics, Costs, Reviews, Evaluation, Operation costs, Operation and maintenance, *Water treatment.
Identifiers: Up flow filters.

Modern powerplants require very pure water. Generally, distilled water is not pure enough. The use of ion exchange equipment is a must as the pressure and temperature of modern plants progressively increases with every new boiler/turbine generation. Normally, the water in supercritical boilers must have over 50 part per billion total contaminants. Under actual normal operating conditions this usually runs between 10 to 12 parts per billion. In order to accomplish this type of purity, boiler makeup water passes through strong acid cation exchanger and a strong base anion exchanger. Resins used in these ion exchange units average $25.00/cu ft for cation to $65.00/cu ft for the anion resins, making an investment of some $12,000. Replacement of this resin is generally assumed at 100% every 5-7 years. At Baxter Wilson Steam Electric Station in Mississippi, due to the excessive chlorine in the water, two loads of resin were damaged at a cost of $24,000 in a period of three years. The use of an up flow filter has demonstrated the feasibility of producing Mississippi River water of equal or better effluent quality than clarifier. Evaluations are made of up flow filters made by three major manufacturers, each with their own patented devices that, in general, reflect the firm's particular philosophy of accomplishing the job. (See also W74-03212) (Woodard-USGS)
W74-03220

VIRUS REMOVAL IN HAWAIIAN SOILS,
Hawaii Univ., Honolulu.
R. H. F. Young, and N. C. Burbank, Jr.
Journal American Water Works Association, Vol 65, No 9, Part 1, p 598-604, September 1973. 9 fig, 2 tab, 35 ref.

Descriptors: *Viruses, *Soils, Efficiencies, *Percolating water, *Leaching, Retention, *Hawaii, Bacteriophage, Soil types, Subsoil, Percolation, Laboratory tests, Seepage, Cesspools, Groundwater, Water quality control, Water supply, *Path of pollutants, Sampling, Adsorption, *Water treatment.
Identifiers: Lactosols, Volcanic cinder, Pollutant removal, Wahiawa soil, Lahaina soil, Poliovirus II, Coliphage T4, Tantalus cinder.

Three types of Hawaiian soils (Wahiawa, Lahaina and Tantalus) were used in laboratory studies in percolation columns to determine the extent of travel or possible breakthrough of viruses into the underlying source of water supply. The viruses used were a coliphage T4 BII mutant, and poliovirus Type II (Lansing) H8. The columns containing the selected soils were subjected to intermittent percolating water with a known concentration of virus, simulating the action of a cesspool leaching into the ground. The effluent from the soil column was collected and analyzed for viral content by plaque-forming techniques. The Wahiawa

and Lahaina soils were 100 percent effective in the retention or adsorption of bacteriophage T4 from percolating water at the applied concentration of 2.5 million/ml of feed solution at depths of 6 and 2.5 in. Breakthrough of the bacteriophage occurred immediately in both soils for the 1.5-in.-deep soil columns at an applied concentration of 1.5 million/ml of feed solution. The Tantalus cinder subsoil proved ineffective in holding the bacteriophage at the recorded thicknesses of 15, 12, and 6 in. at the applied concentration 1.5 million/ml of feed solution. The breakthrough concentration was 5000,000/ml. Percolation tests with Wahiawa and Lahaina soils and Tantalus cinder demonstrated that short soil columns did not completely remove poliovirus Type II from percolating water when the virus was applied at a dosage of 150,000 pfu/ml. Breakthrough occurred immediately for the 1 1/2- and 2 1/2-in. soil columns. Results with Tantalus cinder dosed at 150,000 pfu/ml of poliovirus Type II demonstrated very low virus retention. (Holoman-Battelle)
W74-03293

IDENTIFICATION AND INCIDENCE OF KLEBSIELLA IN CHLORINATED WATER SUPPLIES,
Chicago Dept. of Water and Sewers, Ill. Water Purification Div.
For primary bibliographic entry see Field 05A.
W74-03294

A MATHEMATICAL MODEL FOR OPTIMUM DESIGN AND CONTROL OF METROPOLITAN WASTEWATER MANAGEMENT SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05D.
W74-03468

EMPHASIZING QUALITY CONTROL,
Seattle Dept. of Water, Wash.
J. Courchene, A. Smythe, and A. Wallace.
Journal of the American Water Works Association, Vol 65, No 11, p 743-745, November, 1973. 1 tab, 2 photos, 3 ref.

Descriptors: *Water quality control, *Water treatment, Quality control, Water quality, *Water storage, *Water distribution (Applied), Chlorination, Groundwater mining.
Identifiers: Flushing, Free chlorine residuals.

Quality control is part of the price of doing business and the water industry is no exception to this rule. Accordingly, practices are outlined to maintain water quality by source protection, treatment, and care in storage and distribution. Seven quantitative indexes of water quality are proposed. Surface waters are subject to pollution from lumbering, livestock grazing, agriculture, recreation, and domestic or industrial wastes. Continuous water source surveillance is necessary, together with land use and subdivision controls near shorelines. Groundwaters are subject to different problems of quality control than surface waters; watertight casings should line all wells to the depth of the first impervious rock formation. There should be continuous chlorination of water supplies, even without evidence of bacterial pollution. Frequent sampling of treated water is urged. Methods are suggested for keeping small animals and birds out of stored water. To protect water from contamination in mains, chlorine should be introduced so as to result in a free chlorine residual of at least 50 ppm for 24 hours. After 24 hours, the chlorine residual should be at least 25 ppm if there is a sufficiently low bacteria count in the main. Regular flushing, electronic and sonic leak detection, following up customer complaints, and checking for cross-connections of sewerage lines with water lines are other practices recommended for maintaining water quality. (Stein - North Carolina)
W74-03636

FILTRATION SYSTEM FOR LIQUIDS,
Coleco Industries, Inc., Hartford, Conn. (assignee).
N. L. Reiner.
U.S. Patent No 3,767,050, 5 p, 8 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 915, No 4, p 1294, October 23, 1973.

Descriptors: *Patents, *Swimming pools, *Filtration, *Water treatment, Water quality control, Recreation facilities, Waste water treatment.

A filtration system for liquids employs a sealed tank that is partially filled with sand or the like to provide a filtration bed in the lower portion. An underdrain device is buried in the bed of sand and prevents particles from passing out from the bed with the liquid flowing through the system. One end of a vent conduit is attached to the underdrain device from which it passes up through the sand to a point near the top of the tank. Air introduced into the tank escapes automatically through the vent conduit, thus eliminating the need for the valves which are conventionally provided in the upper portion of such tank filters for the same purpose. The filtration system includes a particulate or sand filter unit coupled with a fabric type filter to remove very fine particles from the liquid removed from the liquid treated in the sand filter unit. The system is particularly adapted for use with swimming pools, and is capable of removing very fine particles from water flowing at high rates through the system. (Sinha - OEIS)
W74-03662

5G. Water Quality Control

PROCEEDINGS, MISSISSIPPI WATER RESOURCES CONFERENCE, 1973.
Mississippi State Univ., State College. Water Resources Research Inst.
For primary bibliographic entry see Field 05B.
W74-03212

MATHEMATICAL MODELING OF WATER QUALITY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05B.
W74-03217

MULTIPLE OUTLET SELECTIVE WITHDRAWAL TECHNIQUE FOR WATER QUALITY PREDICTION OF LAKE RELEASES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05B.
W74-03218

UNDERGROUND WASTE MANAGEMENT AND ARTIFICIAL RECHARGE, VOLUMES 1 AND 2.
American Association of Petroleum Geologists, Inc., Tulsa, Okla.
For primary bibliographic entry see Field 05E.
W74-03222

WATER LAW AND ITS RELATIONSHIP TO ENVIRONMENTAL QUALITY: A BIBLIOGRAPHY OF SOURCE MATERIAL,
Colorado State Univ., Ft. Collins. Dept. of Economics.
G. Radosevich, D. Allardice, G. Swanson, and K. Koebel.
Available from the National Technical Information Service as PB-226 816, $4.50 in paper copy, $1.45 in microfiche. Colorado Environmental Resources Center, Ft. Collins, Information Series No. 6, February 1973. 126 p. OWRR C-3107 (No 3686) (1).

Descriptors: *Legal aspects, *Laws, *Bibliographies, *Publications, *Habitats, *Aesthetics, *Recreation, Wildlife habitat, *Water law.

A bibliography is presented of legal, institutional and related source materials on the subject of water law in relationship to environmental quality and of related discussions of the natural resource aspects of water resources. These resource publications, often based upon research or inventories, form in general the background for the laws and regulations. The topic has been narrowed so that specific emphasis is on fish and wildlife habitat and recreational and aesthetic aspects. In the traditional sense of water law, only quantity characteristics of water are covered. This project and bibliography have also confined the field of examination to water quantity considerations. Water quality and pollution control are already investigated in previously completed bibliographies. The approach has been to divide the sources into the broad categories of state materials, interstate or regional materials, and federal materials. Each of these areas is broken down into legal relating to water, legal relating to fish and wildlife and natural resources reports. Customary classifications and listing of legal data sources have been utilized to rank the citation. The sources contained in the bibliography are not annotated. (Sears-Florida)
W74-03322

POLITICAL AND ENVIRONMENTAL ATTITUDES OF VOTERS AND PUBLIC OFFICIALS RELATED TO ALTERNATIVE LEVELS OF WATER QUALITY AND CORRELATIVE LEVELS OF MANAGEMENT OF THE PENOBSCOT RIVER,
Maine Univ., Orono. Dept. of Political Science.
J. S. Henderson.
Available from the National Technical Information Service as PB-226 770, $4.50 in paper copy, $1.45 in microfiche. August 3, 1973. 120 p, 12 fig, 35 tab. OWRR A-025-ME (1).

Descriptors: *Political aspects, *Governments, *Local governments, *State governments, *Employment, *Water pollution, Legislation, Legal aspects, Pollution abatement, State jurisdiction, Environmental effects, *Maine, Pollution taxes (Charges).
Identifiers: Effluent charge concept, Penobscot River.

This project was conducted to determine public attitudes concerning political aspects of environmental control. An opinion survey of registered voters and elected local officials in the Penobscot Project area revealed agreement that pollution is the major issue facing Maine and that current anti-pollution laws are inadequate. A similar survey of members of the 105th Maine Legislature showed them divided on the importance of the issue, and generally content with present anti-pollution legislation. All groups were optimistic about restoring the river 'to a good condition in about 20 years'. Large majorities reject loss of employment as a bar to pollution control programs. Strong government controls are acceptable to most of those surveyed. The 'effluent charge' concept is overwhelmingly supported by voters and local officials, while legislators are divided. No single, dominant 'cause-and-effect' perception of Penobscot pollution exists among voters. (Sears-Florida)
W74-03323

USER ATTITUDES TOWARD WATER QUALITY AND PRICE, LAS VEGAS VALLEY AND RENO-SPARKS, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
L. Reichert, and J. Leland.
Available from the National Technical Information Service as PB-226 876, $9.50 in paper copy, $1.45 in microfiche. Report October 1971. 121 p, 3 fig, 6 tab, 25 ref, 6 append. OWRR A-036-NEV (1), OWRR A-036-NEV (2).

Descriptors: *Attitudes, *Water quality, *Testing procedures, Social values, Water demand, Statistical methods, Data collection, *Nevada, Costs.
Identifiers: Reno (Nev), Sparks (Nev), Las Vegas (Nev).

While there is much discussion on water quality, little is known about what people will pay for varying levels of water quality. A pilot project is presented which develops and pretests a questionnaire in Nevada's two main urban centers, Reno-Sparks and Las Vegas, to evaluate variables which may affect people's valuation of water quality. The personal interview questionnaire centers on: (1) source and quality of household water; (2) respondent's attitude towards water treatment, inside and outside the household; (3) price of water to household; (4) damages resulting from varying water quality; (5) respondent's expected change in water use given a change in price; and (6) respondent's knowledge and attitudes towards water pollution and supply. High and low quality and cost areas are identified in the region. Respondents are classified according to a modified Warner Index of Status Characteristics. Relationships are hypothesized between water use and designated independent variables, including quality, cost and status. Problems of sampling and generalizing from samples are discussed. A preliminary version of the interview questionnaire is listed, and a number of the questions and responses are briefly summarized. (Schroeder-Wisconsin)
W74-03331

PROPOSED MUNICIPAL WASTE WATER--GROUNDWATER EXCHANGE, CITY OF TUCSON: AVRA-MARANA VALLEY.
Arizona Water Resources Research Center, Tucson; and Arizona Agricultural Experiment Station, Tucson.

Available from the National Technical Information Service as PB-226 910, $4.00 in paper copy, $1.45 in microfiche. University of Arizona College of Agriculture Publication, 1971. 7 p, 2 tab. OWRR A-022-ARIZ (3).

Descriptors: *Municipal wastes, *Irrigation, *Groundwater resources, *Water supply, *Arizona, Water quality, Water utilization, Agriculture, Methodology.
Identifiers: *Water exchange system, Tucson (Ariz), Avra Valley (Ariz).

The city of Tucson, Pima County, Arizona, and agricultural interests in the Avra Valley have an opportunity to work together for their own benefit and that of the entire community. University of Arizona Water Resources Research Center and the Agricultural Engineering Department have proposed a plan for treated waste water produced by the Tucson metropolitan area to be allocated to farmers in the Avra-Marana area in exchange for groundwater now used for irrigation. The waste water would be used only on land presently under irrigation. Scientists from the University of Arizona College of Agriculture have studied the use of Tucson municipal waste water for irrigation of crops and report favorable results. The Avra Valley groundwater is of high quality for municipal use. The proposed exchange project is compatible with the Central Arizona Project (CAP). The same distribution system built to carry treated municipal waste water could be designed to carry a mixture of CAP water and waste water to the irrigated areas of Arva Valley. The CAP water c ould either be replaced by waste water as the municipal demand increased, or exchanged for groundwater which, unlike CAP water, requires no additional treatment for municipal use. (Woodard-USGS)
W74-03340

TIDAL INLETS FOR PRESERVATION OF ESTUARIES,
Lockwood, Andrews and Newnam, Inc., Houston, Tex.
For primary bibliographic entry see Field 02L.
W74-03342

TOWARD ENVIRONMENTAL SANITY,
Environmental Protection Agency, Washington, D.C.
W. D. Ruckelshaus.
J Environ Qual. Vol 1, No 3, p 275-278. 1972.
Identifiers: *Environmental protection, Laws, Noise, Pesticides, *Pollution abatement, Radiation, Solid wastes, *Water pollution control, Potable water, *Federal agencies.

Growing national demand for environmental controls led to establishment of the Environmental Protection Agency (EPA) which is charged with planning and executing an integrated, coordinated attack on environmental problems of air and water pollution, drinking water quality, solid wastes management, pesticides, radiation and noise. Other Federal agencies also play a part in environmental control. A strong EPA regional organization was established. Progress is being made toward pollution control in a number of areas, but much more remains to be done. One emphasis of EPA program is on research and demonstration to combat present problems and to help anticipate future problems. Pollution control standards and laws must be enforced energetically or little will be gained. Continued public support of national, state and local environmental control programs is basic to success.--Copyright 1973, Biological Abstracts, Inc.
W74-03346

INDUSTRIAL WASTEWATER-INJECTION WELLS IN UNITED STATES--STATUS OF USE AND REGULATION, 1973,
Missouri Univ., Rolla. Dept. of Geological Engineering.
For primary bibliographic entry see Field 05E.
W74-03355

CORPORATE IMMUNITY FROM PROSECUTION UNDER THE FEDERAL WATER POLLUTION CONTROL ACT.

Texas Law Review, Vol 51, No 1, p 155-163, December 1972. 8 p, 43 ref.

Descriptors: *Federal Water Pollution Control Act, *Texas, *Rivers and Harbors Act, *Water Quality Act, *Oil spills, Water pollution control, Pollutants, Chemical wastes, Legislation, Legal aspects, Judicial decisions, Water pollution sources, Oil pollution, Water pollution.
Identifiers: *Immunity.

As part of the federal effort to stop water pollution, the Water Quality Improvement Act requires the 'person in charge' of a vessel or other facility to notify the Coast Guard of any oil discharge into neighboring waters, and further provides that information thus obtained cannot be used in any criminal case against the person making the report. Most criminal prosecutions for water pollution arise under the Rivers and Harbors Act of 1899 which makes the unauthorized discharge of 'refuse matter' into navigable water unlawful. The result of the juxtaposition of the two statutes is that if the court finds that the 'person in charge' of the facility did in fact make the report, the statutory immunity of the Water Quality Act prevents prosecution. In the case discussed, the 5th Circuit Court concluded that a 'person' may be a corporate entity and that the owner-operator of a facility is 'in charge' of the facility. The conclusions were reached in spite of the fact that the legislative history indicates that 'person' refers only to natural persons. Thus corporate polluters are given a ready escape which will hinder federal land state antipollution efforts. (McKnight-Florida)
W74-03376

THE DRAFT UNITED NATIONS CONVENTION ON THE INTERNATIONAL SEABED AREA - AMERICAN BAR ASSOCIATION POSITION,
American Bar Association, Washington, D.C. Natural Resources Law Section.
For primary bibliographic entry see Field 06E.
W74-03377

PRIVATE COMPENSATION FOR INJURIES SUSTAINED BY THE DISCHARGE OF OIL FROM VESSELS ON THE NAVIGABLE WATERS OF THE UNITED STATES: A SURVEY,
Port of Miami, Fla.
T. R. Post.
Journal of Maritime Law and Commerce, Vol 4, No 1, p 25-65, October 1972. 41 p, 206 ref.

Descriptors: *Oil pollution, *Oil spills, *Compensation, *Legal aspects, *Water Quality Act, Federal government, Water pollution, Legislation, Common law, Constitutional law, International law, Judicial decisions, Jurisdiction, Negligence, Penalties (Legal), Trespass, Navigable waters.
Identifiers: *Legal liability, *Refuse Act of 1899, *Nuisance (Legal aspects), Unseaworthiness.

This study examines the methods by which private persons may seek compensation for damages they sustain as a result of the discharge of oil from vessels on the navigable waters of the United States. The sources of maritime oil discharges, the trend toward increasing tanker sizes and the effects of oil discharges are reviewed. The basis upon which liability may be asserted is discussed. Compensation based on concepts of tort liability such as trespass, negligence, nuisance, and unseaworthiness may in certain circumstances be had. Compensation may also be based upon certain federal anti-pollution statutes such as the Water Quality Improvement Act of 1970 and the Refuse Act of 1899. Although the current federal anti-pollution statutes which prohibits oil pollution on the navigable waters of the United States do not explicitly provide for private civil relief, it has been suggested that implied causes of action may nevertheless be available to oil pollution claimant on the basis of some of these statutes. Compensation may also be based upon state anti-pollution statutes. The possibilities of compensation based upon international conventions is discussed. Several alternatives to the existing federal laws are proposed. (Reed-Florida)
W74-03378

ENVIRONMENTAL LAW - WATER POLLUTION REMEDIES - USE OF PUBLIC NUISANCE THEORY IN SUIT BY FEDERAL GOVERNMENT - UNITED STATES V. IRA S. BUSHEY AND SONS, INC.,
G. H. Barnes.
Boston College Industrial and Commercial Law Review, Vol 14, 767-785, April 1973. 19 p, 103 ref.

Descriptors: *Water pollution, *Pollution abatement, *Legal aspects, *Interstate, Oil spills, Judicial decisions, Water pollution sources, Oil wastes, Oily water, Oil industry.
Identifiers: Nuisance (Legal aspects).

The United States sought permanent injunctive relief in federal district court to prevent defendant corporations from conducting their oil transport operations without complying with certain safety procedures designed to minimize the danger of future oil spills and leakages. In the subject case the court held that in a suit brought by the federal government, a complaint alleging pollution in violation of the Refuse Act states a claim upon which relief may be granted under the federal common law of public nuisance. This article traces the background of public nuisance, examining its traditional scope and problems associated with its use. The history of the protection of interstate and navigable waters is explored, noting the use of

public nuisance to protect these waters. This article then considers and evaluates the discussion of the doctrine of public nuisance by the court in the instant case in its denial of defendants' motion to dismiss. An attempt is made to resolve the issues raised in the case by suggesting an alternative ground for the decision, predicated on the conclusion that the public nuisance doctrine was misused by the court. (Sears-Florida)
W74-03381

COURSE OF ACTION UNDER FEDERAL COMMON LAW FOR POLLUTION OF INTERSTATE WATERS,
C. W. Watson.
Dickinson Law Review, Vol 77, 451-458, Winter 1973. 8 p, 68 ref.

Descriptors: *Water pollution, *Pollution abatement, *Legal aspects, *Interstate, *Lake Michigan, Governmental interrelation, Judicial decisions, United States, Common law, Municipal wastes, Water quality, Wisconsin, Illinois.
Identifiers: Nuisance (Legal aspects).

The U.S. Supreme Court in the subject case established a cause of action in aggrieved states, under the federal common law of nuisance, for the pollution of interstate waters by citizens of another state. The State of Illinois sued four Wisconsin cities and two sewerage commissions for their pollution of Lake Michigan. Illinois sought to invoke the original jurisdiction of the United States Supreme Court on the basis that the action was one in which a state was a party. The court, in a unanimous decision, held that when interstate water is polluted an action arises under the common law of the United States, and the parties have federal question jurisdiction in the federal district courts. This decision seemingly overruled an earlier Supreme Court decision. This author of this article asserts that no longer will states with high quality water standards be without a remedy against citizens of neighboring states with lesser standards who pollute common waters and that theoretically the decision allows an action in federal district court by a private individual for abatement of a nuisance to his land arising from the pollution of interstate waters. (Sears-Florida)
W74-03382

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES, SERIES I: LEGISLATIVE AND REGULATORY REPORTS.
Environmental Protection Agency, Washington, D.C. Office of International Activities.

April 1973. 129 p.

Descriptors: *Legal aspects, *International law, Laws, *Organizations, *Bibliographies, *Foreign countries, Europe, *Legislation, *Regulation, Water quality.
Identifiers: National Environmental Protection Agency.

The U.S. Environmental Protection Agency (EPA) with the cooperation of other national environmental organizations, is developing a collection of documents related to environmental laws and regulations throughout the world. This report is a preliminary bibliography of document received by the EPA through document exchanges with other countries. Additional contributions will be included in the final version. This bibliography contains summaries of the various laws, stating the language in which it is written, the date of the publication and its length. The summaries are organized by country. The countries covered in this bibliography include: Belgium, Canada, Czechoslovakia, Eastern Europe (Regional), France, Federal Republic of Germany, Great Britain, Italy, Japan, Netherlands, New Zealand, Norway, South Africa, Spain, Sweden, Switzerland, United States, Union of Soviet Socialist Republic, Western Europe (Regional) and Yugoslavia. (Sears-Florida)
W74-03383

THE SUBSTANTIVE RIGHT TO ENVIRONMENTAL QUALITY UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT,
For primary bibliographic entry see Field 06E.
W74-03384

STATEMENT FOR PUBLIC MEETINGS OF THE DEPARTMENT OF ARMY CORPS OF ENGINEERS CONCERNING THE REFORMULATION OF THE SIXES BRIDGE, DAM, AND LAKE PROJECT MARYLAND, AND THE VERONA DAM AND LAKE PROJECT, VIRGINIA,
Interstate Commission on the Potomac River Basin, Washington, D.C.
P. Eastman.
April 25-27, 1973. 5 p.

Descriptors: *Interstate commissions, *River Basins Commissions, *Interstate Compacts, *Water pollution control, *Water supply, Impoundments, Maryland, Pennsylvania, *West Virginia, District of Colombia, *Potomac River.

The Interstate Commission on the Potomac River Basin (ICPRB) was established in 1940 by a compact among the states of Maryland, Pennsylvania, Virginia, and West Virginia and the District of Columbia for the purpose of promoting and coordinating water pollution control in the Potomac Basin. A 1971 resolution of the ICPRB recognized the need for additional impoundment projects to meet water supply requirements and the possible use of the Potomac Estuary for said purpose. In March of 1973 the ICPRB identified the Verona and Sixes Bridge projects as the most viable alternatives to provide the needed water supply. Related developments supporting the two impoundments include recommendations of the Washington Area Interstate Water Resources Program, passage of the Federal Water Pollution Control Act Amendments of 1972 and the Congressional action on the 1972 Rivers and Harbors and Flood Control Legislation. The report also considers a comprehensive set of alternatives for water supply for the Washington, D.C. area. (Sears-Florida)
W74-03386

WATER POLLUTION CONTROL HANDBOOK--A CITIZENS GUIDE TO THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972--VOLUME II,
Natural Resources Defense Council, Washington, D.C. Project on Clean Water.
B. Reid.
July 1973. 71 p, 1 tab, 3 append.

Descriptors: *Water pollution controk, *Permits, *Effluents, Regulation, United States, Environmental protection, Federal Water Pollution Control Act, Legislation, Administrative agencies, Water quality control, Water resources.

This volume of the water pollution control handbook examines certain aspects of the National Pollutant Discharge Elimination System (NPDES). The Federal Water Pollution Control Act Amendments of 1972 provide that the Environmental Protection Agency (EPA) shall issue all NPDES permits unless a state qualifies to run the program. Each state that desires control of the permit program must take an application to EPA, fulfilling certain requirements of the act and guidelines issued by EPA. During the period in which the state does not qualify to run the NPDES, EPA has the authority to issue permits to dischargers. Because of the many technical questions raised in the issuance of individual permits, the project on clean water has produced this volume to examine in detail the process with emphasis on EPA procedures. The volume focuses on analysis of guidelines, sources for the effluent limitations and reviews pertinent technical issues and it outlines avenues of redress in protesting the issuance of an individual permit. (Daniels-Florida)
W74-03388

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT BY PROVIDING FOR REGULATION OF DUMPING IN UNITED STATES WATERS.
For primary bibliographic entry see Field 06E.
W74-03390

CONCURRENT RESOLUTION EXPRESSING THE SENSE OF THE CONGRESS WITH RESPECT TO WATER POLLUTION.
For primary bibliographic entry see Field 06E.
W74-03393

A BILL TO IMPLEMENT THE INTERNATIONAL CONVENTION ON CIVIL LIABILITY FOR OIL POLLUTION DAMAGE AND THE INTERNATIONAL CONVENTION ON THE ESTABLISHMENT OF AN INTERNATIONAL FUND FOR COMPENSATION FOR OIL POLLUTION DAMAGE.
For primary bibliographic entry see Field 06E.
W74-03395

A BILL AUTHORIZING THE CONSTRUCTION, REPAIR, AND PRESERVATION OF CERTAIN PUBLIC WORKS ON RIVERS AND HARBORS FOR NAVIGATION, FLOOD CONTROL, AND OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W74-03396

BANKLICK CREEK WATERSHED (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-03398

AN ACT TO REGULATE THE TRANSPORTATION FOR DUMPING, AND THE DUMPING OF MATERIAL INTO OCEAN WATER, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 06E.
W74-03399

UNITED STATES V. PENNSYLVANIA INDUSTRIAL CHEMICAL CORP. CORPORATION WAS CONVICTED OF DISCHARGING REFUSE INTO NAVIGABLE WATERS IN VIOLATION OF RIVERS AND HARBORS ACT OF 1899, AND IT APPEALED).
For primary bibliographic entry see Field 06E.
W74-03407

CENTRAL BUCKS JOINT SCHOOL BUILDING AUTHORITY V. RAWLS (ACTION BY LANDOWNER TO RECOVER COMPENSATION FOR ALLEGED DE FACTO TAKING OF PROPERTY).
For primary bibliographic entry see Field 06G.
W74-03409

SEWERAGE DISTRICTS AND SEWERAGE DISTRICT BOARDS.
For primary bibliographic entry see Field 06E.
W74-03411

STATE ASSISTANCE FOR LOCAL GOVERNMENT.
For primary bibliographic entry see Field 06E.
W74-03412

SOAP AND DETERGENT ASSOCIATION V. CITY OF CHICAGO (DECLARATORY ACTION TO SET ASIDE CITY ORDINANCE PROHIBITING SALE OF PHOSPHATE DETERGENTS).
For primary bibliographic entry see Field 06E.
W74-03414

U.S. V. JOSEPH G. MORETTI, INC. (LAND FILLS DEEMED 'STRUCTURES' UNDER RIVERS AND HARBORS ACT OF 1899).
For primary bibliographic entry see Field 06E.
W74-03416

KINGS COUNTY ECONOMIC COMMUNITY DEVELOPMENT ASSOCIATION V. HARDIN (PAYMENT OF FARM SUBSIDIES DO NOT REQUIRE NEPA APPROVAL).
For primary bibliographic entry see Field 06E.
W74-03417

THE NATION'S ESTUARIES: SAN FRANCISCO BAY AND DELTA, CALIFORNIA.

Hearing--Subcomm on Government Operations, House of Representatives, 91st Cong, 1st Sess, May 15, 1969. 251 p, 6 map, 4 chart, 2 append.

Descriptors: *California, *Bays, *Landfills, *Water pollution, *Estuarine environment, Environmental effects, Pollutants, Fishkill, Aquatic habitats, Governmental interrelations, Federal government, Ecology, Water resources, Effluents, Balances and nature, Bodies of water.

This subcommittee hearing concerned water pollution and landfill problems in San Francisco Bay and was the first phase of a study of the destruction of the Nation's estuaries and waterways by pollution and excessive filling. San Francisco Bay is one of the world's great natural harbors and it is vital to the economy and ecology of the entire San Francisco area. The bay area now faces a serious environmental crisis and the problems will worsen as the area's population increases. Diking and filling of the shoreline have already reduced the bay's water area to 60% of what it was 100 years ago. The subcommittee received detailed testimony about a wide range of particular problems which the land fill and pollution have precipitated, including the detrimental effects on the population of fish, oysters, crabs, and shrimp. The general concensus of those who addressed the subcommittee was that unless drastic measures are taken in the near future, the bay will soon be a sewer-like river, devoid of aquatic life. (McKnight-Florida)
W74-03420

CITY OF CHAMPAIGN V. ENVIRONMENTAL PROTECTION AGENCY (ADMINISTRATIVE PROCEEDING FOR ALLEGED POLLUTION AGAINST CITY, UNIVERSITY BOARD OF TRUSTEES AND OTHERS).
For primary bibliographic entry see Field 06E.
W74-03421

CHARLES V. DIAMOND (EXTENT TO WHICH POLICE POWERS MAY BE USED TO DISADVANTAGE INTERESTS IN PRIVATE PROPERTY).
For primary bibliographic entry see Field 06E.
W74-03422

CAMPAIGN CLEAN WATER, INC. V. RUCKELSHAUS, (ACTION BROUGHT AGAINST ADMINISTRATOR OF ENVIRONMENTAL PROTECTION AGENCY CHALLENGING IMPOUNDMENT WITH RESPECT TO FUNDS AUTHORIZED TO BE APPROPRIATED BY CONGRESS).
For primary bibliographic entry see Field 06E.
W74-03424

CAPE HENRY BIRD CLUB V. LAIRD (ACTION FOR INJUNCTIVE AND DECLARATORY RELIEF, ON ENVIRONMENTAL GROUNDS, AGAINST FEDERAL DAM PROJECT).
For primary bibliographic entry see Field 06E.
W74-03425

U.S. V. REYNOLDS METALS COMPANY (CORPORATE IMMUNITY FOR POLLUTION UNDER RIVERS AND HARBORS ACT OF 1899),
For primary bibliographic entry see Field 06E.
W74-03426

A PLANNING MODEL FOR A WATER QUALITY MANAGEMENT AGENCY,
SDL Inst., Toronto (Ontario).
A. C. Taylor.
Management Science, Vol 20, No 4, p 675-685, December, Part II, 1973. 4 tab, 9 ref.

Descriptors: *Water quality control, *Waste water (Pollution), *River basins, *Management, *Planning, *Standards, Bids, Optimum development plans, Mathematical models, Systems analysis.
Identifiers: *Rent allotment, Agencies, Ottawa River (Canada).

The Canada Water Act provides for establishment of regional management agencies in areas designated as water quality management areas. The agencies establish water quality standards within their area and design a control program to meet these standards efficiently and economically. Described is a model for planning an effective water quality program within a river basin. The waste abatement control employed is called the rent allotment control, whose merit is that its implementation provides a solution to the information problem of efficient waste abatement. Control is implemented through a bargaining process between the agency and the waste dischargers, characterized as an n-person prisoner's dilemma. The game provides information about individual waste abatement costs, and terminates in a set of agreements on rents and allotments which depend upon the bidding strategies adopted by each player. Optimal bidding strategies are examined. Presented as an example is the simulation of the operation of the rent allocation scheme using data from the Ottawa River in eastern Ontario. The rent allotment game encourages dischargers to estimate their waste abatement activity in face of a declared effluent charge and to declare the allotment this would require. (Bell-Cornell)
W74-03469

ANALYZING THE ENVIRONMENTAL IMPACTS OF WATER PROJECTS.
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06G.
W74-03472

THE RESOLUTION OF UNCERTAINTY,
George Washington Univ., Washington, D.C. National Law Center.
H. P. Green.
Natural Resources Journal, Vol 12, No 2, p 182-186, 1972.

Descriptors: *Decision making, *Social participation, Pollutant identification, Technology, *Risks, DDT, Air pollution, Water pollution, Environmental effects, *Political aspects, Costs, Benefits.
Identifiers: Automobile, Internal combustion engine.

The basic difficulty in dealing with pollutants is inability to predict their adverse consequences. Determination of harm arising from such activities is typically made well after the technology, production or consumption activity has become entrenched. This leads to a number of political difficulties as groups affected by reversals attempt to protect their interest. The essential need is to develop political institutions which give an equal forum to potentially adverse environmental effects. Within this forum, the existence of unresolved uncertainty should be regarded as a substantial environmental cost of the technology in determining whether the technology should be implemented. It is apparent that laws limiting introduction of technology until uncertainty is resolved may result in no new technology being introduced. While this extreme point is not advocated, a strong case is made that the implications of uncertainty be clearly articulated so that the public can decide whether the potential benefits and costs justify the introduction of a new technology. (Schroeder-Wisconsin)
W74-03479

A GUIDE TO DECISION MAKING FOR WATER RESOURCES MANAGEMENT IN THE SAN ANTONIO REGION.
San Antonio River Authority, Tex.
For primary bibliographic entry see Field 06B.
W74-03484

RESOURCE ALLOCATION, INFORMATION COST AND THE FORM OF GOVERNMENT INTERVENTION,
California Inst. of Tech., Pasadena. Environmental Quality Lab.
J. E. Krier, and W. D. Montgomery.
Natural Resources Journal, Vol 13, No 1, p 89-105, 1973. 24 ref.

Descriptors: *Regulation, Standards, Pollution taxes (Charges), Economic efficiency, Decision making, *Marginal costs, Pricing, *Pollution abatement, Welfare (Economics), *Resources allocation.
Identifiers: Externalities, *Government intervention, Price system.

Demsetz's thesis suggests that property rights developed when gains from its development exceeded its costs. These same forces which created a private property system also determine the form of governmental intervention when the property system fails. A classic example of such a failure is pollution. High transaction costs have prevented the private market from internalizing pollution costs. Government intervention has been limited to the setting of standards which have minimal information costs. Standards do not yield an efficient solution because producer's varying marginal costs would be monumental. The price system could bring about marginal cost pricing at a significantly lower cost, although at greater information cost than for existing standards. At present the marginal gains from greater efficiency in converting to the price system are less than its additional information costs even though the benefit from invoking a general standard are justified. As resources like clean air and water become scarcer and hence more valuable, marginal cost pricing through the price system will become justified. An examination of governmental statements shows that regulation through the use of the price system rather than standards has gained support in recent years. (Schroeder-Wisconsin)
W74-03485

ANALYSIS OF COSTS OF POLLUTION CONTROL.
Organization for Economic Co-Operation and Development, Paris (France).

1973. 9 p.

Descriptors: *Cost analysis, *Economic impact, *Pollution abatement, Industries, Foreign trade, Resource allocation, Estimated costs, Water pollution control.
Identifiers: Pollution control costs, Macroeconomics, *OECD.

Pollution control will probably increase in all of the major industrial Member countries of the Organization for Economic Co-operation and Development. This will mitigate the effects of pollution control measures on international trade and balance of payments. Differences in the magnitude and timing of pollution control costs may have some effects on international trade. On the basis of present estimates pollution control costs will be considerably lower than some other welfare oriented expenditures and defense spending. This gives some indication of the impact of pollution control costs on a nation's ability to satisfy other needs of its society on the macroeconomic level. It should be noted that present estimates do not take into account resource saving attributable to pollution control. Pollution control measures will lead to a shift in the use of economic resources but this shift in most cases will probably not be greater than many other changes experienced in Member countries. Pollution control in some individual plants and parts of an industry may, in some cases, affect their competitive position, both in international and internal trade. Data for Member countries, where costs are presently being evaluated in depth, are not included in this study. (Slattery-Wisconsin)
W74-03486

THE POLLUTION CONTENT OF AMERICAN TRADE,
New York Univ., N.Y.
I. Walter.
Western Economic Journal, Vol 11, No 1, p 61-70, 1973. 2 tab, 28 ref.

Descriptors: *Foreign trade, *Pollution abatement, *Costs, Environmental effects, Environmental control, Competitive prices, Industries, Agriculture, Transportation, Utilities.
Identifiers: *International trade, Balance of payments, Exports, Imports.

This study attempts to determine whether environmental control charges incurred by industry form an essentially 'trade-neutral' pattern, or whether they are fundamentally export-biased or import-biased. If U.S. exports are inherently more pollution-intensive than imports, then whatever pattern of environmental policies eventually emerges among the major trading nations will impact disproportionately on U.S. performance in the international market. Environmental control costs for 18 manufacturing industries, aggregate mining, transportation, utilities, commercial services, communication, and agriculture are derived from current research and development expenditures, depreciation charges on in-place pollution control equipment, the capital cost of in-place pollution control equipment, and current operating costs associated with environmental management. The estimated environmental control costs per dollar of gross industry sales is generated from these figures. These industry-based estimates were then translated into product-based cost estimates utilizing 83 goods and services categories in order to apply them in an international trade context. Preliminary findings indicate that for the United States such a bias might be adverse, but only marginally so. The impact on the direction of trade and on the international competitiveness of the individual economic sectors could be substantial. (Slattery-Wisconsin)
W74-03490

ECONOMIC GROWTH AND ENVIRONMENTAL DECAY: THE SOLUTION BECOMES THE PROBLEM,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W74-03492

POLLUTION: ECONOMY AND ENVIRONMENT,
Kent Univ., Canterbury (England). Dept. of Economics.
For primary bibliographic entry see Field 06B.
W74-03493

CONSTRUCTING NONLINEAR DYNAMIC MODELS FOR SOCIO-ENVIRONMENTAL DECISIONMAKING: A METHODOLOGY,
California Univ., Davis. Inst. of Governmental Affairs.
For primary bibliographic entry see Field 06A.
W74-03501

USEFUL WATERS FOR CALIFORNIA.
California State Water Resources Control Board, Sacramento.

Final Report, 1967. 20 fig.

Descriptors: *Water pollution control, *Water quality, *California, *Administration, Legislation, Hydrology, Water resources development, Waste treatment, Government finance, Monitoring.

The work of the State and Regional Water Quality Control Boards since the enactment of the Dickey Water Pollution Act of 1949 to June 30, 1967 is examined. Original concepts, legislative history and each phase of the water pollution and water quality control effort are presented. Water programs in all areas of the State are covered including programs in the North Coastal, San Francisco Bay, Central Coastal, Los Angeles, Central Valley, Lahontan, Colorado River Basin, Santa Ana, and San Diego regions. Community waste treatment facilities, monitoring programs, financial assistance programs, reports of special investigations, and state board actions are among the Board's activities presented. In 1967 the California Legislature enacted important changes in the California Water Code, the Principal change being the consolidation of the State Water Rights Board and the State Water Control Board into a new State Water Resources Control Board. (Slattery-Wisconsin)
W74-03504

MERCURY POLLUTION AND ENFORCEMENT OF THE REFUSE ACT OF 1899 (PART 2).
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 Price $0.75. Hearings -- Subcomm of the Comm on Government Operations, House of Representatives, 92nd Cong, 1st Sess, October 21 and November 5, 1971. 158 p, 2 tab.

Descriptors: *Mercury, *Channels, *Waste dumps, Wastes, Toxicity, Permits, Pollution, Water pollution sources, Governmental interrelations, Legal aspects, United States, Legislation.
Identifiers: *Refuse Act of 1899, Congressional hearings.

The House Conservation and Natural Resources Subcommittee conducted hearings on enforcement of the 1899 Refuse Act by the Corps of Engineers and other agencies on actions taken or planned by the Environmental Protection Agency and the Justice Department concerning the mercury polluters. The subcommittee also wanted to learn why Administration officials were negotiating an agreement to let Armco Steel dump its toxic wastes into the Houston ship channel, in light of a recent Federal district court order prohibiting such dumping. Statements are included from representatives of the Corps of Engineers, Department of Justice and Environmental Protection Agency. Copies of correspondence between the subcommittee and all three entities; copies of newspaper articles; materials submitted by the Corps of Engineers; and a copy of Interior Department 'Guidelines for Federal Permit Applications in Navigable Waters' also are included. (Sears-Florida)
W74-03558

DELAYED RECOVERY OF A MESOTROPHIC LAKE AFTER NUTRIENT DIVERSION,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05C.
W74-03560

MASTER PLAN FOR WATER SUPPLY, BUCKS COUNTY, PENNSYLVANIA, 1970.
Justin and Courtney, Philadelphia, Pa.
For primary bibliographic entry see Field 03D.
W74-03629

EMPHASIZING QUALITY CONTROL,
Seattle Dept. of Water, Wash.
For primary bibliographic entry see Field 05F.
W74-03636

CLEANUP OF POLLUTED RHINE RIVER WILL COST WESTERN EUROPE BILLIONS.

Engineering News-Record, Vol 191, No 14, p 40-41, October 4, 1973. 1 fig, 5 photos.

Descriptors: *Water quality control, *Thermal pollution, *Pollution abatement, *Chlorides, Water temperature, Europe, Powerplants.
Identifiers: *International agreements, Groundwater depletion, *Rhine River.

Despite expenditures of $2.5 billion for primary and secondary treatment of municipal wastes and $187 million for industrial waste treatment between 1966 and 1971, the Rhine River grows more polluted because effluent dumped into the river increases. The single largest source of pollution are potash mines in Alsace which dump 270 lbs. of chlorides per second into the river. Approximately 20 million Germans and 7 million Dutch rely on the Rhine for household water. Since groundwater supplies are low and becoming exhausted, dependence on the Rhine will grow. Thermal pollution from future powerplants has been nipped by an international agreement requiring cooling towers for future power plants so that the river is at no point heated 5F above its normal temperature and never over 84F. Without the ban on thermal pollution, it is estimated that river temperature would rise to 95F by 1985. The West German Interior Ministry is designing a bill to charge a tax for municipalities and industries which dump untreated wastes into the river. The Dutch passed a similar law for industries in 1971. International agreements have resulted in a Frence Commitment to cut chloride dumping in half and a sharing of the $200 million costs to build new disposal facilities. The German water treatment plant on the Emscher River 10 miles from the Netherlands is cited as an example of international cooperation. Expenditures to date must be doubled or tripled in order to achieve 100% secondary treatment for municipal wastes by 1980. (Stein - North Carolina)
W74-03637

RESPONSIBILITIES OF LOCAL AUTHORITIES FOR WATER POLLUTION CONTROL.

British Water Supply, No 4, p 16-23, April, 1973.

Descriptors: *Local governments, *Europe, *Water pollution control, Governmental interrelations, Locating, Planning.
Identifiers: Siting, Police measures.

Replies to a survey administered by the Council of Europe's Committee on Co-operation in Municipal and Regional Matters on responsibilities of local authorities in Europe for prevention of water pollution are analyzed. Recently there has been a trend toward comprehensive national legislation to control pollution. With the exception of countries

with federal structures, legislation for water pollution control is normally prepared by central governments and delegated to relevant localities to implement. Two of the three general responsibilities of local authorities for water pollution control are considered here: (1) planning to regulate location of activities likely to affect water quality and (2) police measures to prohibit discharge and drainage likely to pollute watercourses and groundwater. Local planning controls generally include ability to control siting, grant building permits, and ability to plot sewerage lines and facilities. Police measures are usually exercised within narrowly prescribed limits. Measures are both preventive and punitive. In some countries, local authorities may impose stricter measures than those which have been nationally prescribed. (Stein - North Carolina)
W74-03639

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME I: METHODOLOGY ANALYSIS OF WATER RESOURCE AREAS.
Alamo Area Council of Governments, San Antonia, Tex.
For primary bibliographic entry see Field 06B.
W74-03642

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME III: SHORT RANGE PROGRAM 1970--1975.
Alamo Area Council of Governments, San Antonio, Tex.
For primary bibliographic entry see Field 06B.
W74-03644

WATER AND SEWER STUDY: PART 2 PLANS AND PROGRAMS, SUMMARY REPORT BUNCOMBE COUNTY, NORTH CAROLINA.
Register and Cummings, Asheville, N.C.

Summary Report prepared for Metropolitan Planning Board, Asheville, N.C. (June, 1971). 4 p, 2 tab, 2 maps.

Descriptors: *Planning, *Water supply, *Sewerage, Urbanization, Leakage, Regional development, Coordination, Water sources, Water quality, *North Carolina.
Identifiers: *Asheville (N.C), Joint facilities, Utility extensions, Buncombe County (N.C.).

Water and sewer systems can serve as a framework for urban development, but they often just follow random urban developments and result in inefficient systems and poor service. Thus, it is important to engage in metropolitan and regional planning to determine the location of major water transmission and sewer lines, treatment plants and wastewater outfalls, and water supply sources, and to plan joint facilities to improve efficiency, management, and service. The short range water plan for the Asheville metropolitan area focuses on deficiencies of the existing systems and programs to correct them such as controlling leakages, extending new water lines, covering small reservoirs, and monitoring treatment plants. Long range water plans and programs call for a single county-wide system based on the existing Asheville system. Short range sewerage plans focus on correcting leakage problems and extending new interceptor sewers. Long range plans emphasize the need for coordinated management of all the sewerage systems in the county under a single public authority, using the Metropolitan Sewerage District as a foundation organization. Elfers-North Carolina)
W74-03645

WATER FACILITIES FOR EAST ORANGE AREA FOR CITY OF ORANGE AND EAST ORANGE COUNTY WATER DISTRICT.
Boyle Engineering, Santa Ana, Calif.
For primary bibliographic entry see Field 03D.
W74-03648

COMPREHENSIVE WATER SYSTEMS NEEDS PLAN, 1970-2000, ALLEGHENY COUNTY, PENNSYLVANIA.
Green Engineering Co., Sewickley, Pa.
For primary bibliographic entry see Field 03D.
W74-03650

CONTROL OF AQUATIC PLANT LIFE,
Pennwalt Corp., Philadelphia, Pa. (Assignee)
For primary bibliographic entry see Field 04A.
W74-03653

INSTALLATION OF UNDERWATER POLLUTION APPARATUS,
Esso Production Research Co., Houston, Tex. (assignee).
T. W. Childers.
U.S. Patent No. 3,770,052, 5 p, 9 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 916, No 1, p 115, November 6, 1973.

Descriptors: *Patents, *Oil pollution, *Pollution abatement, Equipment, Underwater, *Oil wells, *Wells, Water pollution control, Water quality control, Leakage, Seepage control.
Identifiers: Underwater wells.

A method of installing and forming an inverted drip pan roof over both an underwater wellhead and a production manifold for such a wellhead is described. According to the method, a manifold drip pan is arranged over a production manifold. A wellhead drip pan is then run down to the underwater location in a tilted attitude for placement over the wellhead, the leading end of the tilted drip pan facing the direction of the production manifold. The tilted attitude reduces the projection of the wellhead drip pan. The descent of the tilted wellhead drip pan is stopped below and behind the near edge of the manifold drip pan, and the wellhead drip pan is then pivoted. This placement establishes an inverted drip pan roof in which at least the wellhead drip pan portion slopes upwardly from a low point at the trailing end of the wellhead drip pan. It thereby establishes a continuous upwardly inclining passageway over the wellhead and the production manifold along which fugitive oil fluids from the wellhead or the production manifold, or both, will be directed by gravity flow to an uppermost portion of the manifold cover for confinement. (Sinha - OEIS)
W74-03661

CONTROLLING ALGAE WITH 5- (5 BARBITURILIDENE)-RHODANINE,
Gates Rubber Co., Denver, Colo. (assignee).
For primary bibliographic entry see Field 04A.
W74-03665

SORBENT BELT,
Shell Oil Co., New York. (assignee).
R. R. Ayers.
U. S. Patent No 3,770,626, 2 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 916, No 1, p 251, November 6, 1973.

Descriptors: *Patents, Oil spills, Equipment, *Oil pollution, *Pollution abatement, Water pollution control, Water quality control, Separation techniques.
Identifiers: *Sorbent belts.

Free flow paths are used to divert pollutant flow into greater contact with the sorbent body being employed. The sorbent belts are claimed to be superior to others since (1) the configuration of the belt provides free flow paths which pull the pollutant (oil) to the belt thereby reducing the area to be covered by the belt, (2) the free flow paths propel the pollutant into more intimate contact with the sorbent so that the pollutant is more efficiently removed, and (3) the pollutant is imbibed in a shorter residence time because the oil reaches the interior of the belt by free flow, in which surface forces do not predominate, to increase the sorption rate. (Sinha - OEIS)
W74-03672

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1974, PARTS 1 AND 2.
For primary bibliographic entry see Field 06E.
W74-03710

EPA POLLUTION REGULATIONS AND FUEL SHORTAGE: THE IMPACT ON MASS TRANSIT.

Hearing--Subcom. on Urban Mass Transportation--Comm. on Banking and Currency--United States House of Representatives, 93d Cong., 1st sess., July 26, 30, 31, 1973. 683 p, 22 fig, 5 map, 21 tab, 1 ref, 1 append.

Descriptors: *Energy budget, *Highways, *Transportation, Chemical wastes, Oily wastes, Water pollution sources, Fuels, Gasoline, Water pollution effects, Social aspects, Legal aspects, Administrative agencies, Federal government, Legislation.
Identifiers: *Congressional hearings, *Mass transit, Energy conservation, Energy crisis.

These hearings concerned the Environmental Protection Agency pollution regulations and their impact on mass transit. Witnesses included many federal, state, transportation and energy personnel. Also included were political interest groups and university research centers. These witnesses discussed and examined the energy crisis, and the role mass transit can play in alleviating that crisis. The Environmental Protection Agency representatives discussed the relation between air pollution and the reliance on the automobile, and the need for increased reliance on mass transit in the future. Whether EPA standards are being relaxed to cope with the fuel crisis was also a topic of deep concern. Methods of conserving fuel other than mass transit were also discussed. Testimony was taken as to the effect of EPA regulations on transit system development. Air pollution, basically as a result of the automobile, is the chief environmental problem. However, due to the necessity for increased energy supplies, water pollution may increase in the future. (Sperling-Florida)
W74-03711

RECYCLING WASTES FOR MARICULTURE,
H. V. R. Palmer, Jr.
Sea Frontiers, Vol 19, p 368-369, November-December 1973. 4 photo.

Descriptors: *Algae, *Sewage, *Sewage disposal, *Recycling, *Oysters, Water pollution control, Nutrients, Nitrates, Phosphates, Ammonia, Wastes, Organic wastes, Tertiary treatment, Viruses, Water pollution, Water pollution sources, Sea water, Effluents, Waste water disposal, Reclaimed water.
Identifiers: *Mariculture, Seaweed.

The Woods Hole Oceanographic Institution in Massachusetts is attempting to utilize the beneficial, nontoxic materials contained in sewage. These nontoxic constituents consist, among other things, of phosphates, nitrates and ammonia, and are essential to the growth of plant life in the oceans. By introducing secondarily treated sewage

into normal seawater, algae consume the nutrients from the effluent, providing in effect, tertiary treatment of the sewage. Next, the cleansed water containing the algae passes into an open tank with racks of oysters, which feed on the algae. The type of system described could in the future serve a coastal municipality as a combined sewage treatment/mariculture facility. A problem being attacked at the facility is that of wastes excreted by the oysters, necessitating the introduction of seaweed into the oyster farm to consume the dissolved wastes. Solid wastes can be consumed by certain bottom-dwelling invertebrates, such as marine worms and crustaceans. Some process however must be found to cleanse viruses from the effluent before it reaches the oyster farm, since oysters can concentrate viruses in their meat. (Ritchie-Florida)
W74-03714

CRIMINAL OFFENSES--POLLUTION).
For primary bibliographic entry see Field 06E.
W74-03722

ZONING--SUBDIVISION OF LAND.
For primary bibliographic entry see Field 06E.
W74-03723

INTERTIDAL SALT MARSHES--PENALTY.
For primary bibliographic entry see Field 06E.
W74-03727

ELIMINATION OF MOSQUITO-BREEDING PLACES.
For primary bibliographic entry see Field 06E.
W74-03730

WATER POLLUTION CONTROL.
For primary bibliographic entry see Field 06E.
W74-03733

MUNICIPALITIES--LAKE AUTHORITIES.
For primary bibliographic entry see Field 06E.
W74-03734

OHIO RIVER VALLEY WATER SANITATION COMMISSION.
For primary bibliographic entry see Field 06E.
W74-03736

TUNING DOWN THE GNP,
Reilly, Like and Schneider, Babylon, N.Y.
For primary bibliographic entry see Field 06G.
W74-03744

POLLUTION CONTROL AND THE BEHAVIOR OF THE FIRM--A TECHNICAL NOTE,
Colorado State Univ., Fort Collins.
L-S. Fan, and B. R. Froehlich.
The Engineering Economist, Vol 17, No 4, p 261-267, 1972. 3 ref.

Descriptors: *Pollution taxes (Charges), *Economic efficiency, *Pollution abatement, *Water quality standards.
Identifiers: Effluent market, *Concave programming, Multiproduct firms.

The effects of pollution standards and a waste surcharge on a multiproduct firm's profit maximization decision are examined in order to illustrate the limited usefulness of the classical first-order profit maximization conditions. The firm considered is a supplier of abated effluents to an existing market. Total revenue to the firm is the sum of the revenues from products plus revenue from the sale of recovered effluent. Total cost includes production costs plus abatement costs and effluent surcharges. It is assumed that firms attempt to satisfy only the minimum pollution standard, thereby requiring all the pollution constraints to be met as strict equalities. This may be consistent with a firm's short run decisions. First-order conditions are generated for the competitive and noncompetitive case. For the first, profits are maximized when the market price of a particular product equals the marginal costs plus the sum of the net marginal costs of abatement and disposal. In the second case, maximization occurs by equating marginal revenue to the costs above. Only in the case of no effluent markets and constraints does the classical profit maximization point lead to an optimal solution. (Schroeder-Wisconsin)
W74-03749

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

SIMULATION OF A PETROLEUM REFINERY WASTE TREATMENT PROCESS,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05D.
W74-03467

A MATHEMATICAL MODEL FOR OPTIMUM DESIGN AND CONTROL OF METROPOLITAN WASTEWATER MANAGEMENT SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 05D.
W74-03468

A PLANNING MODEL FOR A WATER QUALITY MANAGEMENT AGENCY,
SDL Inst., Toronto (Ontario).
For primary bibliographic entry see Field 05G.
W74-03469

A DYNAMIC PROGRAMMING--SIMULATION STRATEGY FOR THE CAPACITY EXPANSION OF HYDROELECTRIC POWER SYSTEMS,
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08C.
W74-03470

ANALYZING THE ENVIRONMENTAL IMPACTS OF WATER PROJECTS.
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06G.
W74-03472

CONSTRUCTING NONLINEAR DYNAMIC MODELS FOR SOCIO-ENVIRONMENTAL DECISIONMAKING: A METHODOLOGY,
California Univ., Davis. Inst. of Governmental Affairs.
W. Arnold, III, J. W. Young, and J. W. Brewer.
Environmental Qualigy Series No 11, October 1972. 138 p, 45 fig, 15 tab, 27 ref.

Descriptors: *Methodology, *Systems analysis, *Environmental effects, *Social aspects, *Economics, Model studies, Decision making, Data collections, Analytical techniques, Simulation analysis, Dynamic programming, California.
Identifiers: *Lake Tahoe Basin (Calif-Nevada), *Quasilinearization, *Socioeconomic models, Forrester's formalism, Multipliers.

A methodology for the development of socioeconomic system submodels which could be integrated into environmental impact studies is presented. The so-called method of 'quasilinearization' is incorporated into the model building procedure in order to obtain values of unknown and important parameters. As an example illustrating application of techniques proposed in the model construction methodology, the socioeconomic system of the Lake Tahoe Basin is modeled and unknown parameters in the model identified. It is concluded that social systems experts with little or no mathematical background can be included in the model building process, parameter identification schemes can be employed to determine selected model parameters, re-evaluation of the model after data collection is critical, and methods used for interpretation of some data is a major weakness in the present version of the model. Some topics suggested for future study, based on this research, include integration of the socioeconomic model with environmental submodels to determine the impact of urbanization on the environment, improvement of the quasilinearization scheme, and the development of numerical techniques to reduce long computer run times for systems of large appended state vectors using quasilinearization. (Slattery-Wisconsin)
W74-03501

THE OPTIMAL TIME TO START THE OPERATION OF A DESALTING PLANT IN ISRAEL,
Tel-Aviv Univ. (Israel). Dept. of Economics.
For primary bibliographic entry see Field 03A.
W74-03750

6B. Evaluation Process

SOCIAL COSTS AND BENEFITS OF WATER RESOURCE CONSTRUCTION,
Kentucky Water Resources Inst., Lexington.
R. J. Burdge, and K. S. Johnson.
Available from the National Technical Information Service as PB-226 815; $3.00 in paper copy, $1.45 in microfiche. Research Report No 64, 1973. 36 p, 23 tab, 13 ref. OWRR A-043-KY (1). 14-31-0001-3517. 14-31-0001-3817.

Descriptors: *Social adjustment, *Social impact, *Migration, Social change, *Social values, Social aspects, Project feasibility, Cost-Benefit analysis, Intangible costs, Land appraisals, *Kentucky, Planning, Reservoir construction, *Pre-impoundment.
Identifiers: Forced relocation, Social costs, Social benefits.

The process of relocating individuals and families who must move due to reservoir construction in Kentucky is analyzed and described utilizing data collected in previous research. These data come from four separate studies: a study of community attitudes toward reservoir construction (Johnson County where the Paintsville reservoir is to be constructed), interviews with people who are slated for relocation when the Taylorsville reservoir is constructed, and two sets of interviews with people who have already been relocated due to reservoir construction (Cave Run and Carr Fork). Psychological, social, economic and material costs and benefits associated with forced relocation are presented, and the role of the relocation agency (The Army Corps of Engineers) in the process is described. Generally, the younger, more affluent and educated migrants fare better in the relocation process than older, poorer and less-educated migrants. Particular attention is paid to those people who found relocation psychologically and economically costly because these are unanticipated and usually unrecorded real costs of reservoir construction. Suggestions are given for easing the burden of relocation among those affected. The framework for this report is longitudinal, describing the relocation process from pre-migration to post-relocation. (Grieves - Kentucky)
W74-03204

COMPARATIVE ANALYSIS OF RESIDENTIAL WATER USE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
For primary bibliographic entry see Field 06D.
W74-03324

HUMAN FACTORS INVOLVED IN THE DEVELOPMENT OF A WATERSHED IN YABUCOA,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
F. del Rio, J. Collazo, A. T. Berrios, and N. L. Garcia.
Available from the National Technical Information Service as PB-227 482, $7.25 in paper copy, $1.45 in microfiche. Technical Completion Report, July 1970. 72 p, 65 tab. OWRR A-013-PR (1).

Descriptors: *Social aspects, *Watershed management, *Attitudes, *Puerto Rico, Social change, Social participation, Water resources development, Flood control, Flood damage, Population, Farms, Surveys, Income, Community development, Rural sociology.
Identifiers: *Guayanes River Watershed (P.R.).

A watershed project, including measures designed to eliminate floodwater damage to land, homes, roads, and bridges, was planned for the Yabucoa region in Southeastern Puerto Rico. The area has suffered severe economic loss of property and lives as a result of heavy floods in the past. Many projects, no matter how structurally sound, have failed when the views of the community involved were ignored, when they did not understand the innovations and when they felt that their security was threatened. This study attempts to: determine some of the personal characteristics of the people of the area in terms of age, education, occupation, income, family size and levels of living; characterize the community in terms of socio-psychological factors including community solidarity and cohesion, population mobility, and their attitude toward the present and future; ascertain the knowledge, attitudes, and opinions of the people toward the Guayanes River Watershed Project; determine the farming situation of the area; and arrive at conclusions and formulate suggestions which may help in the program development process and in the evaluation of the watershed project. Researchers envisage that results of this study will assist in counteracting difficulties which may arise in the development of the project. (Slattery-Wisconsin)
W74-03325

USER ATTITUDES TOWARD WATER QUALITY AND PRICE, LAS VEGAS VALLEY AND RENO-SPARKS, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 05G.
W74-03331

INVESTIGATION OF THE PUBLIC AND PRIVATE INTERESTS IN THE CHESAPEAKE BAY AREA,
Maryland Univ., College Park. Dept. of Agricultural and Extension Education.
James W. Longest.
Available from the National Technical Information Service as PB-226 767, $4.25 in paper copy, $1.45 in microfiche. Maryland Water Resources Research Center, College Park, Technical Report No. 16, February 1973. 33 p, 2 fig, 26 ref, 3 append. OWRR A-010-MD (1). 14-01-0001-1840.

Descriptors: *Administration, *Comprehensive planning, *Decision making, Methodology, *Maryland, Social participation, Social values, *Chesapeake Bay, Water utilization, Bays.
Identifiers: *Management control system.

Conflicts often result because of varying goals among water resources users. A management control system is an attempt to bring users together to develop, evaluate and implement goals and programs related to common resources. Selected elements of an Organizational and Management Concepts Classification System developed for use in examining management problems of Chesapeake Bay are described. The model yields a framework to classify social, political and economic entities found in the area. Discussion centers primarily on user responsibilities, system responsibilities and integration as signs of the system's effectiveness. Each user is involved to varying degrees with the planning, development, communication, enactment and endorsement of the common system goals. This involvement may be charted to measure the degree of active user participation. The management system seeks to encourage socialization of the community to the system goals. This includes changing attitudes, maintaining linkages and dividing tasks among users according to their own expertise. (Schroeder-Wisconsin)
W74-03332

THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 04A.
W74-03334

METHODS OF THE CALCULATION OF COST--BENEFIT IN THE CONSTRUCTION OF SEAPORTS,
Z. Fedorowicz.
Public Finance, Vol 27, No 2, p 190-195, 1972.

Descriptors: *Cost-benefit theory, *Harbors, Coastal structures, Coastal engineering, Gross National Product, Foreign trade, Transportation, Ships, Access routes.
Identifiers: *Seaport construction, Transshipping.

A number of political, economic, and social considerations often require development of sea transportation and ports. Parallel decisions on industrial development determine port capacity and construction time through a complicated cost-benefit analysis. A separate analysis is also necessary in choosing between alternative ports meeting these requirements. Each alternative stipulates maximum allowable ship size, and transshipment organization, and facilities which determine investment costs, current exploitation costs and revenues derived from fees and services. The use of benefit-cost analysis on choosing between ports is advocated, while suggesting modifications to account for peculiarities of this investment. These problems arise in part because of the length of the investment and because alternatives may vary not only in terms of total investment but also in terms of the amount of frozen investment over time and its impact on national income. The modified ratio includes the discounted impact on national income of the alternatives. The need to vary the discount ratio over time is also mentioned. Emphasis is given to the need to account for the sizable indirect benefits which arise, including increased shipping revenue, increased transshipping revenue, and decreased expenditures to foreign shippers. (Schroeder-Wisconsin)
W74-03464

COMING TO TERMS WITH GROWTH AND THE ENVIRONMENT,
Minnesota Univ., Minneapolis. Dept. of Economics.
W. W. Heller.
In: 'Energy, Economic Growth, and the Environment,' forum conducted by Resources for the Future, Inc., April 20-21, 1971, Washington, D.C., p 3-29. 18 ref.

Descriptors: *Gross national product, *Ecology, *Welfare (Economics), *Energy, Regulation, Taxes, Pricing, Costs, Pollution abatement, Environment.
Identifiers: *Economic growth.

A number of perceptual differences between ecologists and economists must be reconciled if any joint attach on growth-energy-environment problems is to succeed. Ecologists view an end to economic growth as an environmental imperative. Economists, however, view the structures other than growth as the cause of existing evils. While it seems impossible to see an end of growth, it is essential that the public knows the trade-offs it faces. It is almost certain that such an end will increase tensions between societal groups. It must also be questioned whether environmental decay can be reversed without growth. A second difficulty arises from the economists' use of GNP as a measure of public well-being. The ecologists' contention that existing GNP increases are solely the result of resource depletion cannot be substantiated; however, weaknesses in the measure have led to suggestions for changes in standards in order to reflect social performance. When government intervention is justified, ecologists and economists differ in their choices; choosing regulation or taxation respectively. Economists favor the latter because of its low costs and efficiency implications. Both must consider distributional impacts of any proposed changes. (Schroeder-Wisconsin)
W74-03465

MANAGEMENT SCIENCE IN THE DEVELOPING COUNTRIES: A COMPARATIVE APPROACH TO IRRIGATION FEASIBILITY,
Italconsult, Rome (Italy).
For primary bibliographic entry see Field 03F.
W74-03471

AGGREGATES AND EXTERNALITIES: INFORMATION NEEDS FOR PUBLIC NATURAL RESOURCE DECISION-MAKING,
Resources for the Future, Inc., Washington, D.C.
W. B. Lord, and M. L. Warner.
Natural Resources Journal, Vol 13, No 1, p 106-117, 1973. 9 ref.

Descriptors: *Decision making, *Planning, U.S. Water Resources Council, *Natural resources, Income distribution, Economic efficiency, Cost-benefit analysis, Optimization, Equity, Social participation.
Identifiers: National Environmental Policy Act, *Externalities, Diversity, Closure.

Natural resource decision-making in the United States is viewed as pluralistic, problem solving, and locally oriented. Two different levels of concern arise from natural resource use decisions, in addition to the concern that the original problems be resolved satisfactorily. The first is specific to a particular decision and is normally expressed by persons or groups likely to be affected quite directly by the decision. Concerns at the second level involve effects acting over longer time intervals on all segments of society. The notion of constrints is proposed over the use of optimizing techniques to address these natural resource problems. Constraints in natural resource decision-making include economic efficiency, income distribution, equity, diversity and closure. Economic efficiency requires that an honestly computed benefit/cost ratio be greater than unity. Income distribution would require that a proposed action not result in a less equal distribution of money incomes than would prevail in its absence. Equity would require that the costs of pursuing a particular action be borne by those who would benefit by it. Maintenance of diversity represents a hedge against uncertainity by preserving a wide variety of options and potentials. Closure requires some provision be made for amelioration of all

potentially harmful physical by-products of the action under study. (Slattery-Wisconsin)
W74-03474

NORTH COASTAL AREA INVESTIGATION. SOUTH FORK EEL RIVER STUDY: A SUMMARY OF THE PUBLIC HEARING COMMENTS ON THE PRELIMINARY EDITION DATED JANUARY 1968, FINAL SUPPLEMENT,
California State Dept. of Water Resources, Sacramento.
B. J. Smith, and E. A. Pearson.
Bulletin No. 173, December 1969. 20 p.

Descriptors: *Water resources development, *Water supply, Flood control, Recreation, Fish conservation, Water management (Applied), Reservoir operation, Cost-benefit ratio, *California.
Identifiers: *Public hearing, *Eel River (Calif.).

A public hearing on the results of the South Fork Eel River Study was held jointly by the California Water Commission and the California Department of Water Resources in May, 1968 at Redway. The objective of the study was to analyze possible water development projects in the basin which might be constructed for local water supply, flood control, recreation, and fisheries enhancement. Comments made at the hearing were directed toward the two developments in the basin that were found to be economically justified: Cahto Reservoir Project on Tenmile Creek and Panther Reservoir Project on the East Branch of the South Fork. The majority of people commenting saw the proposed projects as facilities that would help lure more recreationists into an area that has a sagging economy. Some opposition was voiced by landowners in the reservoir areas and by fishermen concerned about the effects of the projects on fishlife. Following the public hearing the Water Commission and Department of Water Resources agreed no further state funds be spent in planning for these projects inasmuch as the necessary recreation and fisheries enhancement funds were unavailable at that time. (Slattery-Wisconsin)
W74-03476

CASTAIC LAKE AREA RECREATION DEVELOPMENT PLAN,
California State Dept. of Water Resources, Sacramento.
H. H. Murata, O. V. Holguin, and P. J. Yates.
Bulletin No. 117-9, March 1970. 15 p, 1 fig, 2 tab.

Descriptors: *Water resources development, *Recreation demand, Recreational facilities, Reservoir storage, Boating, Fishing, Swimming, Camping, Costs, Cost-benefit ratio, *California, Dams.
Identifiers: *Castaic Lake (Calif), Los Angeles County (Calif), Hiking, Picnicking.

Castaic Lake, to be created by an earthfill dam across Castiac Creek, will be a major reservoir of the California State Water Project providing both emergency storage and regulation of water. It will also provide recreation opportunities for northwestern Los Angeles County. The lake will furnish room for high-speed boating, fishing, picnicking, camping, horsebackriding, hiking and sightseeing. The Downstream Pool, with an area of 180 acres of non-fluctuating water surface and environs will provide slow and quiet boating, picnicking, camping, swimming and fishing. Facilities will be completed at an estimated cost of $11,655,000. The recreation use for the Castaic project has been computed by using data available at existing reservoirs and extrapolating those data to provide expectation use through the 50-year period of analysis. The preliminary benefit-cost ratio is 3.5 to 1.0, taking into consideration the variety and quality of recreation, and the aesthetic qualities of the site. (Slattery-Wisconsin)
W74-03481

A GUIDE TO DECISION MAKING FOR WATER RESOURCES MANAGEMENT IN THE SAN ANTONIO REGION.
San Antonio River Authority, Tex.

Interim Report No. 5, February 1971. 25 p, 8 fig.

Descriptors: *Water resource development, *Methodology, *Decision making, *Input-output analysis, Water utilization, Treatment facilities, Costs, Data processing, Data collections, Systems analysis, Project planning, Water demand, Groundwater resources, Return flow, Runoff.
Identifiers: San Antonio (Texas).

Eight interrelated programs exist in water resources planning in the San Antonio region, each having data input and data output. Each centers around inventory analysis in which inputs, outputs, and changes in storage are analyzed. The Unit Demands Program provides a mathematical evaluation of how water use patterns are effected by annual rainfall, water quality, and water costs. The Total Needs Program develops the total water requirements and leftover water for the region. The Leftovers Transportation Program provides estimations of flow characteristics for all lines and waste treatment plants for any prespecified conceptual design. The Return Flow Analysis Program analyzes the capability of existing treatment facilities to handle imposed waste loads. The Soil Reservoir Program provides an estimation of the quantity and quality of runoff water resulting from rainfall. The Water Demand Alternatives Program evaluates the overall effects of meeting water requirements through utilization of groundwater, surface water, return flow, or any combination of the three. The Surface Water Resources Analysis Program analyzes the effect of discharges, withdrawals, spring flow and runoff on the quality and quantity of water in streams and reservoirs. The Groundwater Resources Analysis Program analyzes the effects of water resource programs on the groundwater resources in the region. (Slattery-Wisconsin)
W74-03484

AGRICULTURAL RECONNAISSANCE SUPPLEMENT TO THE MILL CREEK DEVELOPMENT PROJECT.
Schick International, Morgan, Utah.
For primary bibliographic entry see Field 06D.
W74-03488

THE ECONOMIC IMPACT OF A DEEPWATER TERMINAL IN TEXAS,
Texas A and M Univ., College Station. Industrial Economics Research Div.
D. M. Bragg, and J. R. Bradley.
Available from the National Technical Information Service as COM-73-10514, $3.00 in paper copy, $1.45 in microfiche. TAMU-SG-72-213, November 1972. 56 p, 24 fig, 27 tab, 29 ref. Sea Grant 2-35213.

Descriptors: *Harbors, *Offshore platforms, *Economic impact, *Texas, Oil industry, Cost-benefit analysis, Input-output analysis, Costs, Benefits, Transportation.
Identifiers: *Deepwater terminal.

Construction of a deepwater facility will present a clear opportunity for growth to the industrial community in Texas. Expansion will occur in operations such as oil refining and petrochemicals manufacturing, which utilize oil and gas to produce finished products for export and domestic consumption. Firms engaged in activities related to the construction and operation of pipelines, in the provision of transportation services such as ship repair, and the supporting and servicing of the many petroleum-related industries will also grow. Without the deepwater terminal the primary impact to the state would be a loss of future job opportunities for workers, reduced amounts of tax monies for public services and reduced levels of activity throughout the economy. The benefit-cost potential of one or more deepwater terminals in Texas, ranging from 4.8:1 if only transportation costs savings are considered, to 238:1 when including the economic impact should leave no doubt as to the desirability of these facilities. Components of a deepwater terminal include: a monobuoy, underwater and offshore pipelines, a platform with pumping equipment, onshore storage tanks and supporting equipment. (Slattery-Wisconsin)
W74-03489

FLOODPLAIN LANDS FOR PARKS AND RECREATION: A CASE STUDY OF MILWAUKEE,
Wisconsin Univ., Madison.
E. J. L. David.
Land Economics, Vol 49, No 2, p 221-226, 1973. 1 fig, 4 ref.

Descriptors: *Flood plains, *Recreation, *Cities, Costs, Project benefits, Parks, Boating, Fishing, Swimming, *Wisconsin.
Identifiers: *Milwaukee (Wis).

Research indicates that flood plains are not necessarily a valuable source of recreation land for metropolitan areas. Milwaukee is used as a case study. Although flood plain land provides an ideal setting for particular kinds of recreational activities, e.g. water-based activities such as boating, fishing and swimming, and will benefit the taxpayer in terms of lower land acquisition costs for the city, there are disadvantages. The kinds of water-based recreation which the rivers provide are limited and flood plain parks are readily available only to a select group of people. Inequities occur both because they are less readily accessible to lower income residents and because flood plains are not uniformly scattered. Emphasis on outdoor flood plain recreation overlooks recreational outlets requiring much less space which seem to be more appropriate for urban areas. This does not mean that flood plains should not be bought for recreational opportunities but does suggest that a much broader spectrum of park and recreational opportunities must be included if recreation for the metropolitan area is to be adequately provided for. (Slattery-Wisconsin)
W74-03491

ECONOMIC GROWTH AND ENVIRONMENTAL DECAY: THE SOLUTION BECOMES THE PROBLEM,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
P. W. Barkley, and D. W. Seckler.
Harcourt Brace Jovanovich, New York, 1972. 193 p, 31 fig, 4 tab, 73 ref.

Descriptors: *Environmental control, *Economic impact, *Pollution abatement, Costs, Environment, Benefits, Cost analysis, Cost-benefit analysis, Market value, Gross national product, Income distribution, Pollution taxes (Charges), Recreation.
Identifiers: *Economic growth, Resource depletion, Externalities, Supply and demand.

Growing economies face environmental deterioration because encroachment on natural resources is one of the first prices to be paid for economic growth. The most common measure of growth is defined to include, in a positive way, things actually detrimental to health, happiness, and the environment. The GNP measures the output of an economy, but this includes negative environmental output such as collecting garbage, the costs of driving to get away from congestion and the cost of cleaning up polluted streams. Thus, the process of growth brings with it unintended aspects -- externalities, loss of collective goods, and the potential impoverishment of future generations. Insofar as these imperfections exist, market prices will not

accurately signal values, and insofar as growth continues under these irrational prices, society is led away from its desired state. Modern economic theory shows that the growth rate of an economy can now be controlled through injections and withdrawals of money in the system and by a variety of other monetary devices. Thus, society can pick its rate of economic growth from a large range of alternatives. If the natural environment is to be maintained, a lower economic growth rate must be selected. (Slattery-Wisconsin)
W74-03492

POLLUTION: ECONOMY AND ENVIRONMENT,
Kent Univ., Canterbury (England). Dept. of Economics.
P. A. Victor.
University of Toronto Press, 1972. 247 p, 48 tab, 163 ref.

Descriptors: *Input-output analysis, *Environment, *Methodology, *Economics, Waste disposal, Industrial production, Industrial wastes, Model studies, Canada, Water utilization, Water pollution, Air pollution, Transportation, Pollutants.
Identifiers: Commodities, Ayres-Kneese model, Cumberland model, Daly model, Isard model, Leontief model, Rosenbluth model, Dominion Bureau of Statistics model.

The connections between human society, and the rest of the universe that are attributable to economic activity, are examined. These include the inputs from the environment to industry, such as oxygen, used in the combustion of mineral fuels and industrial outputs which are fed back into the environment in the form of waste products. Functional relations between the extent and character of economic activity and the flow of materials in both directions between the economy and the environment are established. The interactions of economic activity and the environment are examined in the literature on the construction of models and in commodity-by industry input-output models. Examples of the use of economic-ecologic input-output models are illustrated. The study shows that existing economic models can be extended, both theoretically and empirically, so that the quality and quantity of these material flows become determined by the economic activity of society. An empirical survey of the use of water and the production and disposal of wastes in Canada for the year 1961 is also included. (Slattery-Wisconsin)
W74-03493

THE CALIFORNIA STATE WATER PROJECT IN 1968,
California State Dept. of Water Resources, Sacramento.
J. H. Jaquith.
Bulletin No 132-68, June 1968. 379 p, 7 fig, 51 tab, 3 append.

Descriptors: *Water supply, *Water resources development, *State governments, *Costs, *California, Aqueducts, Dam construction, Operation and Maintenance, Bond issues, Financing, Administration.

Progress on the construction, operation, financing and management of the California State Water Project is reported. Oroville Dam is the key water conservation feature of the project. Storage of water began in November 1967. Water deliveries through Phase II of the North Bay Aqueduct were initiated in Napa County. One-half of the construction of the 444-mile mainline of the California Aqueduct is complete, together with the first 15 miles of the Coastal Branch. Water deliveries are also being made to agencies in the arid side of the San Joaquin Valley. The Project's water rights applications were approved. Contracts were completed for the purchase of Northwest power to supplement the power supply for pumping project water. A contract for the sale of high-value Oroville-Thermalito power was executed with the California Power Pool Companies. Execution of the power sale contract permitted the first sale of revenue bonds. Additional construction funds totaling $219 million are expected to be derived from the proceeds of such sales. In spite of this, a long-term financial deficiency of $269 million is indicated. The estimated total capital cost of the Project, exclusive of future design and construction costs for the San Joaquin Drainage Facilities, is $2,778 million. (Slattery-Wisconsin)
W74-03502

UPPER EEL RIVER DEVELOPMENT. INVESTIGATION OF ALTERNATIVE CONVEYANCE ROUTES,
California State Dept. of Water Resources, Sacramento.
J. M. Youngerman, M. P. Price, K. R. Henneman, and T. L. Hanson.
Bulletin No 171, August 1967. 80 p, 19 fig, 13 tab.

Descriptors: *Water resources development, *California, *Project planning, Diversion, Reservoirs, Water supply, Conveyance structures, Project benefits, Costs, Cost-benefit ratio, Water yield, Benefits, Recreation, Flood control, Alteration of flow, Alternative planning, Future planning (Projected), Watershed management.
Identifiers: *Eel River (Calif), State Water Project (Calif).

The Glenn Route is, by engineering and economic standards, the best route for conveyance of Middle Fork Eel River water to the Sacramento-San Joaquin Delta for use in the California State Water Project by the year 1990. Water will flow from the Middle Fork Eel River east through Glenn and Tehama Counties to the Sacramento River and then to the Delta. The alternative route investigated would have through Clear Lake and down the Sacramento River either through Cache Creek or Putah Creek. The alternative Glenn and Clear Lake conveyance routes were compared for a wide range of sizes using traditional benefit-cost standards for economic comparison. Routing water from reservoirs on the lower Eel River to the Sacramento Valley via the Glenn reservoirs rather than via Clear Lake would result in appreciable cost savings. Other factors taken into consideration were: water quality, flood control, recreation, local water needs, fisheries and wildlife habitat, and hydroelectric power. The most likely plan of development for the Glenn Route is a combination of Dos Rios Reservoir on the Middle Fork Eel River, the Dos Rios-Grindstone Tunnel, and features of the Gleen Reservoir Complex. Several damsites were rejected because of high costs and uncertainties regarding competance of foundation materials. (Slattery-Wisconsin)
W74-03503

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME I: METHODOLOGY ANALYSIS OF WATER RESOURCE AREAS.
Alamo Area Council of Governments, San Antonia, Tex.

Interim Report No. 16. December, 1971. 48 p, 4 fig, 17 tab.

Descriptors: *Texas, *River basins, *Regional development, *Management, *Planning, *Water quality control, Aquifers, Water resource development, Coordination, Groundwater, Projections, Water demand, Environmental effects, Costs, Computer models, Sewerage, Land use.
Identifiers: Bexar County (Texas), Edwards Underground Reservoir, Nueces River Basin, Guadalupe River Basin, Carrizo-Walcox Aquifer, Urban water utilization, *San Antonio River basin.

Objectives of this plan are to provide most cost effective water resource management strategies for meeting projected water uses and maintaining water quality criteria throughout the Alamo Area Planning Region which encompasses the San Antonio Metropolitan region with 90% of the population residing in Bexar County. The planning program is particularly concerned with establishing a continuing planning process which can be easily updated, and with defining a framework for federal, state, and local coordination. Volume I of this report provides a classification of each water resource area. Emphasis is placed on using existing river basin programs and water quality standards. The planning methodology includes long range population forecasting, land use forecasting, identification of water service areas and demands, analysis of water sources, Carrizo Sands Aquifer, Edwards Underground Reservoir, Guadalupe River Basin, Nueces River Basin and the San Antonio River Basin, and their relation to demands, the estimation of the costs of alternative water resources projects until 2000, and the determination of environmental effects from these projects. Computer models are used to simulate environmental effects and quickly estimate costs of alternative land use patterns and proposed water resource systems, especially sewerage systems. Possible elements of an overall management strategy include regional water and sewerage systems, water diversions, wastewater reuse, and land use controls. (See also W74-03643 and W74-03644) (Elfers-North Carolina)
W74-03642

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME II: URBAN WATER-RELATED SERVICES.
Alamo Area Council of Governments, San Antonio, Tex.

Interim Report No. 17. December, 1971. 88 p, 27 fig, 90 tab.

Descriptors: *Planning, Water resource development, *Management, *Land use, *Water demand, *Costs, *Texas, Regional development, Projections, Urbanization, Construction costs, Water quality control, Sewerage, Water supply, Irrigated land.
Identifiers: Bexar County (Tex), Service areas, *San Antonio (Tex).

Focus is on urban water-related services, determining the costs for constructing new water distribution, wastewater collection, and storm water drainage facilities throughout the region. Each of the thirteen counties in the region is examined separately with emphasis on irrigated acreage, urbanization trends, the required water management facilities, and the probable costs of these facilities for the next thirty years (to 2000). The need for the facilities is based on the population and land use forecasts from Volume I of the overall report. The costs of providing the facilities are largely determined from analyzing historical costs and are estimated on a per acre basis, e.g. $500 per acre for new urbanized areas, $100 per acre for existing urbanized areas to provide water distribution facilities; cost of waste water collection (excluding lines less than 12''): $250 for new urbanized areas, $50 per acre for existing urbanized areas; cost of storm water drainage: $500 per acre for total urban area. Service area maps for each county and numerous tables of cost data by service area are included. (See also W74-03642) (Elfers-North Carolina)
W74-03643

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME III: SHORT RANGE PROGRAM 1970--1975.
Alamo Area Council of Governments, San Antonio, Tex.

December, 1971. 9 p, 9 tab.

Descriptors: *Costs, *Project planning, *Texas, Planning, Programs, Water supply, Sewerage, Drainage systems, Flood Control, Regional development.
Identifiers: Implementation, *Capital improvements, Bexar County (Tex), *San Antonio (Tex).

A short range program is presented for implementing the water resource management plan for the San Antonio Metropolitan Region presented in the first two volumes. The implementation program covers the period from 1970 to 1975 and is presented in some detail for the City of San Antonio and eight counties in the planning region. Each implementation program includes a brief description of the plan elements or projects to be undertaken during the period, the estimated cost, and a reference to other reports for more detailed information. The implementation program for Bexar County, the most urbanized county in the region, includes elements for water distribution, wastewater collection, and storm water drainage in several urbanizing parts of the county and flood control projects for the City of San Antonio. Estimated cost is $40,750,000. Proposed storm drainage capital improvements program for the City of San Antonio is estimated to cost $18,518,759. (See also W74-03642) (Elfers-North Carolina)
W74-03644

WATER FACILITIES FOR EAST ORANGE AREA FOR CITY OF ORANGE AND EAST ORANGE COUNTY WATER DISTRICT.
Boyle Engineering, Santa Ana, Calif.
For primary bibliographic entry see Field 03D.
W74-03648

THE WYOMING FRAMEWORK WATER PLAN, A SUMMARY.
Wyoming State Engineer's Office, Cheyenne. Water Planning Program.

May 1973. 24 p.

Descriptors: *Wyoming, *Planning, *Long-term planning, Water utilization, Water demand, *Projections.

The Wyoming Framework Water Plan identifies the long-range (50-year) alternatives for meeting the water needs of the State. It is an inventory of the State's water resources and related lands, a summary of the State's present water uses, a projection of future water needs, and an identification of alternative decisions to meet or not to meet the indicated future water needs. This report is a summary of the Wyoming Framework Water Plan. (Wyoming)
W74-03742

SOCIO-ECONOMIC CONSIDERATIONS IN WATER RESOURCES PLANNING,
Department of the Environment, Ottawa (Ontario). Ecological Systems Research Div.
A. K. Biswas.
Water Resources Bulletin, Vol 9, No 4, p 746-754, 1973. 1 fig, 21 ref.

Descriptors: *Social participation, Decision making, Social values, Water resources development, Income distribution, *Planning, Cost-benefit analysis, *Management.
Identifiers: *Public participation, Environmental quality.

The objectives of water resource planning and management have increased over the years. Early activities had as their objective economic efficiency with benefit-cost analysis being their chief analytical technique. The addition of other objectives has broadened the planning framework and is the result of an attempt to bring in greater public participation. These objectives include regional income redistribution, environmental quality and social well-being. The addition has not been without problems. Measurement of increases and decreases towards these objectives is difficult and highly subjective. Furthermore, multiple objectives are not mutually exclusive, and trade-offs must be made between them. The designing of a system to maximize one of the objectives subject to specified levels of performance of the others is suggested as a way to overcome this difficulty. The planning process is designed to specify and meet the needs of the public. Increased public participation is used to articulate these needs. The difficulty of designing a system to include public participation is briefly discussed. (Schroeder-Wisconsin)
W74-03745

CHANGING ATTITUDES IN WATER RESOURCES DEVELOPMENT IN THE PROVINCE OF MANITOBA,
Department of Mines and Natural Resources, Winnipeg (Manitoba).
N. Mudry.
Water Resources Bulletin, Vol 9, No 3, p 607-612, 1973. 1 fig.

Descriptors: Decision making, *Social values, Planning, Environmental effects, Social adjustment, *Water resource planning, *Canada, North Dakota, *Attitudes, *Social change.
Identifiers: Public concern, Manitoba, Saskatchewan River, Nelson-Churchill River Complex, Pembina River Basin, Saskatchewan-Nelson River Basin.

The Province of Manitoba is endowed with vast water resources. Their use in the production of power and for municipal and industrial purposes has grown steadily since the province's settlement in the 19th century. While economic concerns have been predominant in the development of Manitoba's water resources, the 1960's signaled a period of increasing concern over possible environmental effects of water control and water resource development projects. The change in attitude of the public during the 1960's towards ecological and environmental aspects of proposed projects and the government's response to these concerns are described. These public concerns are noted in proposed hydroelectric plants on the Saskatchewan River at Grand Rapids, and the Nelson-Churchill river complex where a 1971 study agreement established an interdisciplinary group to evaluate the environmental effects of the proposed project. Additional projects mentioned include the extensive flood control program initiated in 1962, the Joint Commission report between North Dakota and Manitoba investigating the Pembina River Basin and the five million dollar water supply study of the Saskatchewan-Nelson Basin begun in 1967 by Canada and the Provinces of Manitoba, Saskatchewan and Alberta. (Schroeder-Wisconsin)
W74-03747

RESERVOIRS AND LOCAL GOVERNMENT FINANCE,
Georgetown Coll., Ky. Dept. of Economics.
C. T. Bates, and D. M. Soule.
In: Growth and Change, University of Kentucky, p 47-51, 1971. 1 tab, 4 ref. OWRR A-006-KY (12).

Descriptors: *Multi-purpose reservoirs, *Taxes, Water resources development, Government finance, *Reservoir construction, Regional economics, *Local governments, *Kentucky.
Identifiers: *Tax severity index.

Not all economic changes related to development of multipurpose reservoirs are desired. A commonly held belief to be tested is whether reservoir development causes local taxes to become more severe because demands for government services increase relative to the local area's ability to pay. A severity index equal to the percentage increase in local tax revenue divided by the percentage increase in local taxpaying ability (full value of taxable property and personal income) is introduced. Three reservoirs in Kentucky are studied over a period from one year prior to initial land acquisition to one year following construction of the dam. Percentage changes are shown for property tax revenue, full value of taxable property and personal income for the county and school governments plus statewide averages for county and school governments. The computation of the tax severity index showed generally low values for the ratios in two of the three project areas. Four factors explain this phenomenon: (1) increasing property values; (2) less than anticipated increases in demands for government services and the existence of some unused capacity in government facilities; (3) development of new revenue sources, including changes in state aid-to-education funds; and (4) the extended period in which development took place. (Schroeder-Wisconsin)
W74-03748

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

MINIMUM COST DESIGN OF WATER DISTRIBUTION SYSTEMS,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 08A.
W74-03205

POLITICAL AND ENVIRONMENTAL ATTITUDES OF VOTERS AND PUBLIC OFFICIALS RELATED TO ALTERNATIVE LEVELS OF WATER QUALITY AND CORRELATIVE LEVELS OF MANAGEMENT OF THE PENOBSCOT RIVER,
Maine Univ., Orono. Dept. of Political Science.
For primary bibliographic entry see Field 05G.
W74-03323

NOMOGRAPHS FOR THERMAL POLLUTION CONTROL SYSTEMS,
Hittman Associates, Inc., Columbia, Md.
For primary bibliographic entry see Field 05D.
W74-03329

USER ATTITUDES TOWARD WATER QUALITY AND PRICE, LAS VEGAS VALLEY AND RENO-SPARKS, NEVADA,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 05G.
W74-03331

VERIFICATION OF GROUNDWATER CAPITAL COSTS,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 04B.
W74-03338

A DYNAMIC PROGRAMMING--SIMULATION STRATEGY FOR THE CAPACITY EXPANSION OF HYDROELECTRIC POWER SYSTEMS,
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08C.
W74-03470

THE ANCHOVY CRISIS,
C. P. Idyll.
Scientific American, Vol 228, No 6, p 22-29, 1973. 4 fig.

Descriptors: *Marine fisheries, *Upwelling, Fishkill, Fish management, Commercial fishing, Fish harvest.
Identifiers: *Anchovies, El Nino, *Peru, Humboldt Current, *Chile.

Peruvian anchovies live in the northern coastal currents which run 2000 miles from Valparaiso, Chile to Chimbote, Peru. The northward flowing water is cold, partially the result of subartic water but primarily because of a natural phenomenon, upwelling. Through upwelling, prevailing winds sweep away surface water and replace it with colder deeper water rich in nutrients. As a result, an excellent environment is created for marine life. This small fraction of the ocean produces nearly 20 percent of all the fish caught in the world. Two problems presently confront the anchovies. The first, El Nino, is a natural phenomena, shifting the winds, decreasing upwelling and warming the water. This disruption of the rich environment has in past periods both reduced and scattered the anchovies making it more difficult for man and natural predators such as the guanobirds to harvest them. The excess growth of commercial fishing also threatens the anchovies. In 1970, the 12.3 million ton catch greatly exceeded the 10 million level estimated to be the maximum sustainable yield. These two factors have placed the anchovy fishery in an uncertain future. (Schroeder-Wisconsin)
W74-03473

ANALYSIS OF COSTS OF POLLUTION CONTROL.
Organization for Economic Co-Operation and Development, Paris (France).
For primary bibliographic entry see Field 05G.
W74-03486

ECONOMIC BENEFITS FROM IRRIGATION,
Texas Tech Univ., Lubbock. Dept. of Agricultural Economics.
J. E. Osborn.
In: Proceedings of Tenth Annual West Texas Water Conference, Lubbock, p 51-56, 1972. 4 tab. HUD 701.

Descriptors: *Economic impact, *Crop production, *Irrigation, Irrigated land, Agriculture, Groundwater resources, Direct benefits, Indirect benefits.
Identifiers: *Texas High Plains region.

As of 1967 a major source of new capital in Texas was agriculture. Production from agriculture has increased significantly with irrigation. The number of irrigated acres increased from approximately 250,000 in 1940 to nearly five million acres in 1967. However, the source of irrigation water is an exhaustible groundwater supply so there are serious long range problems present for replacing this source of capital. The economic importance of irrigation to the region was indicated by the value of the crop production. In 1967, the value of crop production was $775.8 million. Nearly 82 percent of the value of crop production was associated with irrigation. Increases in crop production that can be associated with irrigation provides a series of results in spending in the region. This economic impact of irrigation can be separated into direct, indirect, and stemming-from benefits. The estimated economic benefits from irrigation on crops in the Texas High Plains was $1,561.1 million. The direct economic benefit to resource owners is $363.1 million. The beneficiaries of the indirect and stemming-from economic benefits of $1198 million, include suppliers, consumers and processors. (Slattery-Wisconsin)
W74-03487

THE POLLUTION CONTENT OF AMERICAN TRADE,
New York Univ., N.Y.
For primary bibliographic entry see Field 05G.
W74-03490

UPGRADING LAGOONS,
Brown and Caldwell, San Francisco, Calif.
For primary bibliographic entry see Field 05D.
W74-03495

OXYGEN ACTIVATED SLUDGE WASTEWATER TREATMENT SYSTEMS: DESIGN CRITERIA AND OPERATING EXPERIENCE,
Union Carbide Corp., Tonawanda, N.Y. Linde Div.
For primary bibliographic entry see Field 05D.
W74-03496

PRETREATMENT OF POULTRY PROCESSING WASTES: UPGRADING POULTRY--PROCESSING FACILITIES TO REDUCE POLLUTION,
For primary bibliographic entry see Field 05D.
W74-03497

IN-PROCESS POLLUTION ABATEMENT: UPGRADING POULTRY-PROCESSING FACILITIES TO REDUCE POLLUTION,
Environmental Engineering, Inc., Gainesville, Fla.
For primary bibliographic entry see Field 05D.
W74-03498

WASTE TREATMENT: UPGRADING METAL--FINISHING FACILITIES TO REDUCE POLLUTION,
Lancy Labs., Inc., Zelienople, Pa.
For primary bibliographic entry see Field 05D.
W74-03499

UPGRADING EXISTING WASTEWATER TREATMENT PLANTS: CASE HISTORIES,
Hazen and Sawyer, New York.
For primary bibliographic entry see Field 05D.
W74-03500

THE CALIFORNIA STATE WATER PROJECT IN 1968,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 06B.
W74-03502

PULP AND PAPER MILL WASTES TREATMENT; ALTERNATIVES AND COST ECONOMICS,
Central Public Health Engineering Research Inst., Nagpur (India).
For primary bibliographic entry see Field 05D.
W74-03548

POLLUTION CONTROL AND THE BEHAVIOR OF THE FIRM--A TECHNICAL NOTE,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 05G.
W74-03749

6D. Water Demand

COMPARATIVE ANALYSIS OF RESIDENTIAL WATER USE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Water Resources Research Inst.
A. Guilbe.
Available from the National Technical Information Service as PB-226 768, $4.25 in paper copy, $1.45 in microfiche. Completion Report, November 1972. 93 p, 18 fig, 23 tab, 14 ref. OWRR A-025-PR (1).

Descriptors: *Analysis, *Water utilization, *Estimating, *Model studies, Cities, Urban sociology, Surveys, Water demand, *Puerto Rico.
Identifiers: Public housing, Private housing, Ponce (P.R.), San Juan (P.R.), Mayaguez (P.R.).

This study was conducted with the objectives of developing residential water use models for Ponce and San Juan, Puerto Rice, and comparing these models with a previously developed model for Mayaguez, Puerto Rico. The results of this study have shown the feasibility of estimating water use in private residential developments based on property value as the basic characteristic. The rationale employed was that assessed value of property serves well as an indirect practical indicator of the effect on water use of such socioeconomic factors as number and kind of home water-using fixtures, lawn and garden areas, automobile washing requirements, education, habits, occupation and effective family buying income. Significant differences were observed in comparing private urbanization models for Ponce and Mayaguez and San Juan and Mayaguez respectively. It is therefore recommended that separate models by employed for estimation purposes in these cities. No significant differences were noted for the generated models of the three cities in the public dwellings areas. Thus, a single model is recommended for water use estimation purposes in these areas. (Slattery-Wisconsin)
W74-03324

THE IMPACT OF POLICY VARIABLES ON RESIDENTIAL WATER DEMAND AND RELATED INVESTMENT REQUIREMENTS,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
A. P. Lino Grima, and P. Lino.
Water Resources Bulletin, Vol 9, No 4, p 703-710, 1973. 3 tab, 15 ref.

Descriptors: *Water demand, *Investment, *Urbanization, *Mathematical models, *Water supply, Regression analysis, Water rates, Model studies, Prices, Marginal costs.
Identifiers: *Residential water demand, Water meters, Linear equations, Log-linear equations.

It is estimated that $5,834 million will be invested to adequately provide urban water in 75 developing countries during 1961-75, with $10,200 million to be spent in the U.S. in 1956-65. Fitted log-linear equations are estimated for home water use to investigate how investment costs might be reduced. Independent equation variables include assessed residential value, persons per dwelling, variable water prices and fixed water bill per period. Except for the fixed bill, all regression coefficients were significant at the 0.01 percent level. The resultant equations predictive capacity is illustrated for additional data. The effect of several pricing policies on demand are examined. Price elasticity varys from one to slightly less than one for the summer and winter respectively. The imposition of metering reduces operating and investment costs through decreased demand. However, metering incurs additional purchasing, installation and reading costs. Marginal cost pricing is also examined to make investment more efficient. Nonprice alternatives to reduce demand, including reductions in plumbing fixture capacity and odd-even day lawn sprinkling, are also considered with the latter shown in Toronto to reduce maximum summer demand by nearly 20 percent. (Schroeder-Wisconsin)
W74-03477

RECREATIONAL DEMAND AT LAKES AND RESERVOIRS,
Eno Foundation for Transportation, Inc. Saugatuck, Conn.
G. E. Kanaan, and H. J. Day.
Journal of the Urban Planning and Development Division, American Society of Civil Engineers, Vol 99, No UP2, p 265-269, 1973. 2 tab, 5 ref.

Descriptors: *Recreation demand, Economic justification, Mathematical models, Reservoir operation, Lakes, Data collections, Reservoirs, *Estimated benefits, Water resources development, Cities, *Project planning, Parks, *Ohio.
Identifiers: Dayton (Ohio), Great Miami River basin (Ohio).

Recreational benefits from water resources projects are continuously being incorporated into urban planning studies. Measurement of these benefits is difficult because they are usually provided at no cost. A technique is developed and demonstrated to estimate recreational activity at new facilities with user data from existing state parks. Dollar benefits are found by placing arbitrary values on each recreational experience, similar to the procedures used by the Corps of Engineers and the Bureau of Outdoor Recreation. Demand is assumed to be a function of reservoir surface area, distance from metropolitan areas to reservoirs, reservation characteristics including campsite development, and recreational opportunities including fishing, swimming and boating. To illustrate the predictive capacities of the model, recreational activities of four Ohio reservoirs are estimated. The actual and predicted visitations for the four respectively are: 1,347,000 and 1,150,000; 1,170,000 and 1,300,000; 577,000 and 550,000; and 856,000 and 575,000. This technique may prove useful in cases of limited budgets which permit the acquisition of park attendance data only. (Schroeder-Wisconsin)
W74-03480

CASTAIC LAKE AREA RECREATION DEVELOPMENT PLAN,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 06B.
W74-03481

AGRICULTURAL RECONNAISSANCE SUPPLEMENT TO THE MILL CREEK DEVELOPMENT PROJECT.
Schick International, Morgan, Utah.

Available from the National Technical Information Service as COM-73-10384, $3.00 in paper copy, $1.45 in microfiche. Prepared for Utah Division of Water Resources and Grand County Commission, Moab., September 1971. 189 p, 3 fig, 43 tab, 8 maps, 6 append.

Descriptors: *Water supply development, *Irrigation, *Agriculture, Analysis, Utah, Farm units, Crops, Livestock, *Economic impact, Direct benefits, Indirect benefits.
Identifiers: Mill Creek (Utah), Moab Valley (Utah), Spanish Valley (Utah), Wilson Mesa (Utah), South Mesa (Utah).

Moab Valley, Spanish Valley, Wilson Mesa and South Mesa are major areas considered for development of agricultural resources in the Mill Creek area before the water enters the Colorado River. Studies show additional water can be made available for irrigation from further development of the Mill Creek water supply. This study presents the comparison of benefits each area would produce from irrigation. Physical and economic information on the organization of existing farming units, crops, and livestock production practices, and the location and suitability of lands for irrigation was obtained, organized and analyzed. Total net direct agricultural benefits from the irrigation development should exceed $600,000 annually when existing farm enterprises are fully adjusted to a firm water supply and the new land is brought to the expected production level. $390,000 annually should be derived from increased net return to land and management. Secondary benefits will be about $423,500 annually. The estimated average lag time necessary to reach full direct benefits is four years. Present worth evaluation of the net direct benefits for project development ranges from 16.7 million dollars (using a 3 percent discount rate) and 4.0 million dollars (using a 10 percent discount rate). (Slattery-Wisconsin)
W74-03488

MASTER PLAN FOR WATER SUPPLY, BUCKS COUNTY, PENNSYLVANIA, 1970.
Justin and Courtney, Philadelphia, Pa.
For primary bibliographic entry see Field 03D.
W74-03629

WATER STUDY, SANTA FE PLANNING AREA.
Santa Fe City Planning Dept., N. Mex.
For primary bibliographic entry see Field 04B.
W74-03641

THE WATER RESOURCE MANAGEMENT PLAN FOR THE AACOG PLANNING REGION, VOLUME II: URBAN WATER-RELATED SERVICES.
Alamo Area Council of Governments, San Antonio, Tex.
For primary bibliographic entry see Field 06B.
W74-03643

WATER SUPPLY AND DISTRIBUTION.
Somerset County Planning Board, Somerville, N.J.

September, 1973. 180 p, 37 fig, 2 maps, 1 append. Price: $2.00.

Descriptors: *Planning, *Water supply, *Water demand, *Water distribution (Applied), Groundwater, Water quality, Urbanization, Land use, Soils, Geology, Coordination, Surface waters, Regional development, *New Jersey, Reservoirs.
Identifiers: Somerset County (N.J.), Raritan River, Passaic River Basin, Delaware and Raritan Canal (N.J).

Somerset County, strategically positioned within one of the world's most heavily urbanized areas--between the constantly expanding New York and Philadelphia Metropolitan Region, is changing from a predominantly rural environment to an urban-suburban area. Water resources are seen as key determinants in formulating overall County policy. The basic purposes of this report are to coordinate water resource planning with the comprehensive planning process, to help create a County-wide water supply network, and to promote local and regional coordination. The approach is to review past water resource development in the County and then look at factors related to the future need for water supply systems. Chapters on groundwater and geology, surface water and water quality, existing water supply systems, present and future water demand, and a very general water supply plan are included. The recommendations of the plan include the interconnection of all public water supply systems, the discouragement of new, small water supply systems, the use of system extensions to control urban growth, the protection and acquisition of flood plain areas, the formulation of zoning and subdivision ordinances based on detailed studies of soils and geology, the possible use of quarry sites for water storage, the study of groundwater resources in the county and expansion of the State testing program to insure intense monitoring of quality of surface water resources. (Elfers-North Carolina)
W74-03647

2020 PLAN, BOARD OF WATER SUPPLY/CITY AND COUNTY OF HONOLULU.
Honolulu City and County Board of Water Supply, Hawaii.
For primary bibliographic entry see Field 04B.
W74-03649

COMPREHENSIVE WATER SYSTEMS NEEDS PLAN, 1970-2000, ALLEGHENY COUNTY, PENNSYLVANIA.
Green Engineering Co., Sewickley, Pa.
For primary bibliographic entry see Field 03D.
W74-03650

THE WYOMING FRAMEWORK WATER PLAN, A SUMMARY.
Wyoming State Engineer's Office, Cheyenne. Water Planning Program.
For primary bibliographic entry see Field 06B.
W74-03742

6E. Water Law and Institutions

LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 06F.
W74-03207

WATER LAW AND ITS RELATIONSHIP TO ENVIRONMENTAL QUALITY: A BIBLIOGRAPHY OF SOURCE MATERIAL,
Colorado State Univ., Ft. Collins. Dept. of Economics.
For primary bibliographic entry see Field 05G.
W74-03322

POLITICAL AND ENVIRONMENTAL ATTITUDES OF VOTERS AND PUBLIC OFFICIALS RELATED TO ALTERNATIVE LEVELS OF WATER QUALITY AND CORRELATIVE LEVELS OF MANAGEMENT OF THE PENOBSCOT RIVER,
Maine Univ., Orono. Dept. of Political Science.
For primary bibliographic entry see Field 05G.
W74-03323

TOWARD ENVIRONMENTAL SANITY,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-03346

CORPORATE IMMUNITY FROM PROSECUTION UNDER THE FEDERAL WATER POLLUTION CONTROL ACT.
For primary bibliographic entry see Field 05G.
W74-03376

THE DRAFT UNITED NATIONS CONVENTION ON THE INTERNATIONAL SEABED AREA - AMERICAN BAR ASSOCIATION POSITION,
American Bar Association, Washington, D.C. Natural Resources Law Section.
H. Ely.
Natural Resources Law, Vol 4, No 1, p 60-72, January 1971. 12 p, 2 ref.

Descriptors: *International law, *Legal aspects, *Outer continental shelf, Leases, Oceans, Governments, Governmental interrelations, Water quality standards, Treaties, Law of the sea, Exploitation.
Identifiers: Coastal zone management.

This is a comprehensive analysis of the seabed convention which was submitted to the United Nations Seabed Committee in 1970 by the United States delegation. The proposal would amend the Outer Continental Shelf Lands Act by subjecting future leases to the provisions of any treaty to which the United States may become a party. The philosophy of the treaty is that the coastal states shall renounce or cede their rights under the convention, seaward of the 200 meter line, to the international regime, and receive in return some sort of a qualified title designated as a trusteeship. The significant point is that the source of the power to administer is no longer the Convention on the Continental Shelf or customary law as the International Court of Justice declared it to be. Instead, the source of power of the coastal states would be

the international regime, and the dominant law would be the treaty and its appendixes, which include the full text of a universal seabed mining law. (Mockler-Florida)
W74-03377

PRIVATE COMPENSATION FOR INJURIES SUSTAINED BY THE DISCHARGE OF OIL FROM VESSELS ON THE NAVIGABLE WATERS OF THE UNITED STATES: A SURVEY,
Port of Miami, Fla.
For primary bibliographic entry see Field 05G.
W74-03378

CALIFORNIA COASTAL ZONE CONSERVATION ACT, INTERIM PERMIT CONTROL, GENERAL,
University of Southern California, Los Angeles.
For primary bibliographic entry see Field 06F.
W74-03379

NOTE, ACCESS TO PUBLIC MUNICIPAL BEACHES: THE FORMULATION OF A COMPREHENSIVE LEGAL APPROACH,
R. S. Goldman.
Suffolk University Law Review, Vol VII, 936-972 (1973). 37 p, 2 tab, 185 ref.

Descriptors: *Coasts, *Beaches, *Legal aspects, *Public access, *Constitutional law, Public rights, Adjacent landowners, Shores, Recreation, Seashores.
Identifiers: Public trust doctrine.

American society is presently facing increasing difficulties in providing adequate shoreline recreational facilities to meet the needs of the public at large. Difficulties are further intensified by exclusionary beach access fees charged by local shorefront municipalities. In seeking to establish a public right of beach access, this paper reviews the public trust doctrine and the doctrine of irrevocable dedication. The scope of each doctrine is inherently limited. The position adopted by the author is that the Constitution alones provides the broad applicability and substantive content necessary to support a successful attack upon discriminatory beach access fees. It is argued that the right of public access to shoreline recreational resources is a fundamental right for the purposes of the equal protection clause and that, therefore, beach access fees should be examined with extremely strict judicial scrutiny. The author concludes, however, that even under the 'traditional', less stringent equal protection standard, exclusionary policies practiced by shorefront municipalities fail to pass constitutional muster. (Sears-Florida)
W74-03380

ENVIRONMENTAL LAW - WATER POLLUTION REMEDIES - USE OF PUBLIC NUISANCE THEORY IN SUIT BY FEDERAL GOVERNMENT - UNITED STATES V. IRA S. BUSHEY AND SONS, INC.,
For primary bibliographic entry see Field 05G.
W74-03381

COURSE OF ACTION UNDER FEDERAL COMMON LAW FOR POLLUTION OF INTERSTATE WATERS,
For primary bibliographic entry see Field 05G.
W74-03382

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES, SERIES I: LEGISLATIVE AND REGULATORY REPORTS.
Environmental Protection Agency, Washington, D.C. Office of International Activities.
For primary bibliographic entry see Field 05G.
W74-03383

THE SUBSTANTIVE RIGHT TO ENVIRONMENTAL QUALITY UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT,
R. Arnold.
Environmental Law Reporter, Vol III, No 6, p 50028-50043, June 1973. 16 p, 102 ref.

Descriptors: *United States, *Legislation, *Judicial decisions, *Environmental effects, Balance of nature, Federal government, Governmental interrelations, Ecology.
Identifiers: *National Environmental Policy Act, Sovereign immunity.

Section 101 of the National Environmental Policy Act (NEPA) is the nation's most widely applicable expression of environmental policy. The statute declares policy in broad terms and imposes procedural requirements on federal agencies in rather specific terms, and this article speculates as to whether NEPA also creates substantive rights enforceable in the courts. The language of the statute implies a desire to return to an earlier and better day when environmental quality existed and then to maintain that quality. The statute also indicates that the policies it contains are 'essential'. The nation's courts have taken a wide range of attitudes as to what rights NEPA creates, with some finding clear substantive provisions in the Act, and others saying that NEPA is 'only' a declaration of congressional policy and that it therefore cannot form the basis for an action in court. But congressional policy is the law. Although the Supreme Court has not yet expressed itself clearly on the question, two of its opinions point the way, and the indication in both cases is that NEPA does create substantive rights. (McKnight-Florida)
W74-03384

OPTIMIZING WATER USE: THE RETURN FLOW ISSUE,
Colorado Univ., Boulder. School of Law.
S. Williams.
University of Colorado Law Review, Vol 44, p 301-321, March 1973. 21 p, 2 chart, 83 ref.

Descriptors: *Optimization, *Return flow, Competing uses, Water allocation (Policy), Water distrubution (Applied), Water resources development, Industrial plants, Waste water treatment, *Colorado, *Water utilization, *Prior appropriation.
Identifiers: Water rights (Non-reparians), Denver (Colo).

In a prior appropriation jurisdiction, the owner of a particular water right can transfer this right to another. Obviously, the way in which the new owner utilizes the right he acquires may have either adverse or beneficial effects on downstream appropriators. The present system fails to impose on the transfering parties the exact third party cost of the transfer; conversely it fails to make available to the transferring parties the value of the third party benefits. Thus, there is no assurance that all optimizing transfers will be permitted, nor is there any assurance that transfer with an adverse net impact will be stopped. Two recent case decisions by the Colorado Supreme Court exemplify the current attitude. In the first case, Metropolitan Denver Sewage Dist. No. 1 v. Farmers Reservoir and Irrigation Co., the City of Denver was allowed to transfer its sewage treatment operations to a new location over the protests of appropriators downstream from the new location although the other appropriators would clearly be damaged. In the other case, the City of Denver was allowed to discharge quantities of water at a point on one river which allowed its buyer to use an equivalent amount in its plant on another river. (McKnight-Florida)
W74-03385

STATEMENT FOR PUBLIC MEETINGS OF THE DEPARTMENT OF ARMY CORPS OF ENGINEERS CONCERNING THE REFORMULATION OF THE SIXES BRIDGE, DAM, AND LAKE PROJECT MARYLAND, AND THE VERONA DAM AND LAKE PROJECT, VIRGINIA,
Interstate Commission on the Potomac River Basin, Washington, D.C.
For primary bibliographic entry see Field 05G.
W74-03386

RECYCLING ON THE LAND: AN ALTERNATIVE FOR WATER POLLUTION CONTROL,
Natural Resources Defense Council, Washington, D.C. Project on Clean Water.
For primary bibliographic entry see Field 05D.
W74-03387

WATER POLLUTION CONTROL HANDBOOK--A CITIZENS GUIDE TO THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972--VOLUME II,
Natural Resources Defense Council, Washington, D.C. Project on Clean Water.
For primary bibliographic entry see Field 05G.
W74-03388

A BILL TO PROVIDE FOR THE CONVERSION OF DAM NUMBERED 3 ON THE BIG SANDY RIVER IN KENTUCKY.

House Bill 3477, 93rd Cong, 1st Sess (1973). 2 p.

Descriptors: *Legislation, Federal government, *Kentucky, *West Virginia, Dam construction, Dams, Repairing, Appropriation, Engineering structures, Structures, Water supply, Local governments.

This bill provides for the conversion of dam number 3 on the Big Sandy River in Kentucky to a fixed-type structure, and the repair of the same, in the interest of water supply and other benefits to local interests. The bill provides that the necessary work be provided by the Secretary of the Army, acting through the Chief of Engineers. The dam is located between Kentucky and West Virginia adjacent to Louisa, Kentucky. The work is to have no effect on the conditions that local interests shall own, operate, and maintain the structure and related properties as required by law. The bill authorizes and appropriates such funds as are necessary for the designated work. (Napolitano-Florida)
W74-03389

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT BY PROVIDING FOR REGULATION OF DUMPING IN UNITED STATES WATERS.
House Bill 3101, 93d Cong, 1st Sess (1973). 5 p.

Descriptors: *Legislation, *Waste disposal, *Water pollution, *Ecology, *United States, Sewage disposal, Sludge disposal, Waste water disposal, Ecosystems, Balance of nature, Environmental effects, Oceans, Wildlife, Legal aspects, Administration, Regulation, Water law, Legal review, Penalties (Legal).
Identifiers: *Fish and Wildlife Coordinating Act.

The proposed bill amends the Fish and wildlife Coordination Act so as to provide additional protection to marine and wildlife ecology by providing for the orderly regulation of dumping in the ocean and other waters of the United States. The Administrator of the Environmental Protection Agency and the Secretary of the Interior are to establish standards which will apply to the deposit or discharge of all industrial wastes, sludge, spoil and all other harmful materials in United States waters. Such standards must require that any person, before depositing or discharging such materials into the waters of the United States, must present sufficient evidence to sustain a burden of

proof that such materials, in the location in which they are to be deposited will not endanger the natural environment and ecology. The district courts of the United States are given the jurisdiction to restrain violation under the proposed amendment. (Reed-Florida)
W74-03390

A BILL TO ESTABLISH THE FRENCH PETE CREEK NATIONAL WOODLANDS RECREATION AREA.

House Bill 4373, 93rd Cong, 1st Sess (1973). 4 p.

Descriptors: *Oregon, *Legislation, *United States, *Recreation facilities, Recreation, Public lands, Campsites, Camping, Hunting, Sport fishing, Aesthetics, Lumbering, Administration, Permits, Planning, Regulation, Conservation, Mining, Federal reservation.
Identifiers: *Timber harvesting.

The bill provides for the establishment of the French Pete Creek National Woodland Recreation Area in the Willamette National Forest in Oregon. The Secretary of Agriculture (Secretary) is to administer and develop the area. The Secretary, however, may not construct or permit the construction of public roads, permit the harvesting of timber except in specified circumstances, permit the use of any form of motorized transport within the areas or construct or permit the construction of structures or installations other than walk-in campsites, trail bridges, sanitary facilities and other necessary facilities to further the purpose for which the recreation area is intended. The lands within the recreation area, subject to valid existing rights, would be withdrawn from location, entry and patent under United States mining laws. The Secretary is to permit hunting, fishing and trapping in the area in accordance with applicable federal and state law. (Reed-Florida)
W74-03391

A BILL TO AMEND THE PORTS AND WATERWAYS SAFETY ACT OF 1972.

Senate Bill 80, 93rd Cong, 1st Sess (1973). 10 p.

Descriptors: *Legislation, *United States, *Navigable waters, *Powerplants, *Structures, Coasts, Fish, Shellfish, Wildlife, Resources, Recreation, Scenery, Conservation, Regulation, Administration, Administrative agencies, Damages, Navigation.

This bill, initiated in the U.S. Senate, purports to amend the Ports and Waterways Act of 1972 to provide for authority to be placed in the National Oceanic and Atmospheric Administration (N.O.A.A.) for certification of the environmental soundness of the site selection, construction and operation of offshore artificial structures for ports and terminals, powerplants, airports, and other such facilities to be located in coastal waters. The purpose of such regulation is to prevent damage to coastal navigable waters, the coastal zone, and the resources therein, including, but not limited to, fish, shellfish, and wildlife, marine and coastal resources and recreational and scenic values. Certification is to be issued by the secretary of the department in which the N.O.A.A. is operating if it is determined that such artificial structure (defined in the act) does not pose an unreasonable threat to the integrity of the marine environment in which it is to be located and all possible precautions have been taken to minimize adverse impact. Specifically excluded from structures requiring certification are those used solely in exploring for, developing, or removing resources of the submerged lands. Guidelines are set forth to aid in establishing criteria for evaluating such structures. The penalty for failure to obtain certification is a fine of $50,000-$200,000. (Napolitano-Florida)
W74-03392

CONCURRENT RESOLUTION EXPRESSING THE SENSE OF THE CONGRESS WITH RESPECT TO WATER POLLUTION.
House Concurrent Resolution No 2, 93rd Cong, 1st Sess (January 3, 1973). 2 p.

Descriptors: *Water pollution control, *International law, *International waters, *United States, Water pollution sources, Chemicals, Chemical wastes, Oceans, Military aspects, Organizations, Pollution abatement, Treaties, Law of the sea.

This document contains a concurrent resolution by the House of Representatives with the Senate concurring indicating that it is the sense of the Congress that the pollution of waters all over the world is a matter of vital concern to all nations and should be dealt with as a matter of the highest priority. Moreover, it provides that it is the sense of the Congress that the President, acting through the U.S. delegation to the United Nations Conference on the Human Environment, should take such steps as may be necessary to propose an international agreement, or amendments to existing international agreements, as may be appropriate, providing for coordinated international activities to prohibit the disposal of munitions, chemicals, chemical munitions, military material, and any pollutants in territorial waters, contiguous zones, the deep seabed or any international waters, and otherwise to prevent the pollution of the waters of the world. (Mockler-Florida)
W74-03393

A BILL TO ESTABLISH A NATIONAL FLOOD PLAIN POLICY.
House Bill 7454, 93d Cong, 1st Sess (May 3, 1973). 9 p.

Descriptors: *Flood plains, *Floods, *Flood protection, *Legislation, *United States, Water policy, Administrative agencies, Water law, Flood control, Flood damage, Natural resources, Legal aspects, Rivers, Streams, Flood forecasting, Water management (Applied), Nonstructural alternatives.

The basic purposes of this bill are to establish a national flood plain policy, and to insure that preservation of flood plains and their unique natural functions and values shall be equally considered with other measures planned for the development and management of the Nation's surface and ground water. Encroachment upon flood plains by flood-damagable developments increases the hazards of floods and results in higher costs for effective flood control. It is thus the policy of Congress to preserve, protect, develop and restore the flood capacity and resources of the Nation's flood plain areas. All federal agencies involved in any developmental activity in or on flood plains of the United States are directed to give priority consideration to the protection and preservation of flood plain resources. (Glickman-Florida)
W74-03394

A BILL TO IMPLEMENT THE INTERNATIONAL CONVENTION ON CIVIL LIABILITY FOR OIL POLLUTION DAMAGE AND THE INTERNATIONAL CONVENTION ON THE ESTABLISHMENT OF AN INTERNATIONAL FUND FOR COMPENSATION FOR OIL POLLUTION DAMAGE.
House Bill No 4394, 93d Cong, 1st Sess (February 20, 1973). 35 p.

Descriptors: *International law, *Oil pollution, *Legal aspects, *Legislation, *United States, Water quality standards, Oceans, Oil wastes, Oil industry, Water pollution sources, Oil spills, Treaties, Foreign waters.

The proposed bill would apply exclusively to pollution damage caused on the territory, including the territorial sea, of the United States or of any foreign country which is party to the Liability Convention, and to preventive measures, wherever taken, to prevent or minimize such damage. Nothing in the bill prejudices any right of recourse of the owner against third parties. Moreover, when oil has escaped or has been discharged from two or more ships, resulting in pollution damage, the owners of all the ships concerned shall be jointly and severally liable for all such damage which is not reasonably separable. In addition, any claim for compensation for pollution damage may be brought directly against the guarantor of the owner's liability for pollution damage and, in such a case, the defendant may, irrespective of the actual fault or privity of the owner, avail himself of the limits of liability prescribed in the bill. (Mockler-Florida)
W74-03395

A BILL AUTHORIZING THE CONSTRUCTION, REPAIR, AND PRESERVATION OF CERTAIN PUBLIC WORKS ON RIVERS AND HARBORS FOR NAVIGATION, FLOOD CONTROL, AND OTHER PURPOSES.
Senate Bill no 603, 93d Cong, 1st Sess (January 29, 1973). 9 p.

Descriptors: *Legislation, *United States, *Flood control, *Flood protection, Recreation, Land use, Comprehensive planning, Navigation, Water quantity management, Administration, Legal aspects, Beneficial use, Water resources development.

The various projects covered by this bill include the proposal for hurricane flood protection at Virginia Beach, Virginia; the project for flood protection on Bowie Creek, Mississippi; the project for Camp Ground Lake on Beech Fork in the Salt River Basin, Kentucky; the flood control project on Fall creek, Indiana; the project for flood control on Center Creek near Joplin, Missouri; the West Tennessee tributaries feature, Mississippi River and tributaries project in Tennessee; the Cache River Basin feature, Mississippi River and tributaries project in Arkansas; the project for flood control and other purposes on the Blanco River at Clopton Crossing, Texas; and the project for flood control on the South Umpqua River in Oregon. The legislation authorizes comprehensive review of the use of these lands for recreation and fish and wildlife purposes and solicits recommendations as to those measures which should be undertaken to insure the best use of such lands. (Mockler-Florida)
W74-03396

AN ACT TO REGULATE THE TRANSPORTATION FOR DUMPING, AND THE DUMPING OF MATERIAL INTO OCEAN WATER, AND FOR OTHER PURPOSES.
Public Law 92-532, 92nd Cong, Hr 9727, October 23, 1972.

Descriptors: *Waste disposal, *Environmental effects, *Sludge disposal, *Legislation, *United States, Radioactive waste disposal, Waste water disposal, Sewerage, Public health, Wildlife, Marine biology, Ecosystems, Ocean waters, Water pollution, Environmental control, Permits, Protection, Legislation.
Identifiers: Environmental effects.

The Marine Protection, Research and Sanctuaries Act of 1972 was set up to regulate the transportation for dumping and the dumping of material into ocean waters. Congress has declared that it is the United States policy to regulate the dumping of all types of materials into ocean waters and to prevent or strictly limit the dumping into ocean waters of any material which would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. To prohibit such acts, Environmental Protection Agency permits must be obtained to authorize transportation and dumping

into ocean waters any of the polluting wastes designated. The need, effect on health, welfare, shoreline, wildlife, and marine life, and alternatives shall be considered in granting such a permit. The Act makes adequate provisions for regulation, enforcement, liabilities and penalties to carry out the Act's overall purpose. (Daniels-Florida)
W74-03399

INTERSTATE DRAINS.

Ind Ann Stat secs 27-2601 thru 27-2606 (1970).

Descriptors: *Indiana, *Statutes, *Drainage, Legal aspects, Jurisdiction, Water quality control, Water resources development, Local governments, Water law, Water policy, Governmental interrelations, Drainage districts.

These are the Indiana Annotated Statutes dealing with interstate drains. The statutes provide that whenever a petition to construct or reconstruct a drain is filed pursuant to this Act, or when preceedings are initiated in an adjoining state to construct or reconstruct a drain, and when the proposed improvement will affect lands in the state and also in an adjoining state, the board shall have the authority to join with the proper officials in a joint effort to construct or reconstruct such drain. Moreover, upon receiving final reports of proposed improvements, the drainage board of Indiana shall assess the benefits and damages to each tract of land affected in the state, and in so doing the board shall be governed by the provisions of this Act as applied to a drain located solely within the state. Whenever the improvement is finally and conclusively established in two or more states and when funds are available, interstate boards shall meet and let work contracts. (Mockler-Florida)
W74-03400

MAINTENANCE OF DAMS, LEVEES AND FLOOD CONTROL WORKS.
Ind Ann Stat secs 27-1801 thru 27-1808 (1970).

Descriptors: *Indiana, *Legislation, *Dams, *Flood control, *Levees, Engineering structures, Flood prevention, Dikes, River regulation, Shore protection, Retaining walls, Earth works, Administration.

The statutes provide that the Indiana flood control and water resources commission shall, on behalf of the state, have jurisdiction and supervision over the state of the maintenance and repair of dams, levees, dikes, flood walls, and appurtenant works in, on, or along the rivers, streams, and lakes of the state and shall exercise care to see that such structures are maintained in a good and sufficient state of repair and operating condition to fully perform their intended purpose. The commission is authorized to adopt standards and regulations as may be necessary for the purposes of the act. Moreover, the commission may in its discretion vary the standards for maintenance and operation, giving due consideration to the type and location of the structure, the hazards to which it is or may be exposed and the peril to life or property in the event of the structure's failure to perform its function. The commission is also authorized to make engineering inspections of all dams, levees, dikes, and floodwalls at least once a year. (Mockler-Florida)
W74-03401

HOWE V. DI PIERRO MANUFACTURING CO., INC. (APPEAL BY DEFENDANTS FROM AN ORDER ENJOINING THEM FROM FLOODING PLAINTIFF'S PROPERTY).
294 N.E. 2d 495-498 (Mass. App. 1973).

Descriptors: *Massachusetts, *Riparian rights, *Natural flow doctrine, *Alteration of flow, Riparian waters, Reasonable use, Surface drainage, Flooding, Water policy, Damages, Legal aspects, Judicial decisions.
Identifiers: Injunctive relief.

The plaintiffs, owners of real property, brought a suit in equity praying for injunctive and general relief from defendants, neighboring land owners. Plaintiffs contended that the combined effect of actions of defendants in filling in a pond and a swamp and enclosing a natural watercourse within a culvert caused permanent injury to their property. Defendants built a parking lot where the pond and swamp had been and installed a drainage system which collected surface waters and emptied them into the culvert unreasonably causing the flooding of the plaintiffs' property. Such injury would be permanent unless defendants were to somehow rectify the condition. The court held that although the source of water introduced by riparian owners into a natural stream is a manufacturing process rather than a collection of surface waters, the application of general rule concerning rights of riparian owners is not changed. The plaintiff was granted injunctive relief designed to restore his property to the condition in which it would have been if it had never been injured, but was not given damages for diminution in value. (Daniels-Florida)
W74-03402

CITY OF MIDWAY V. MIDWAY NURSING AND CONVALESCENT CENTER, INC. (SUIT BY CITY TO ENJOIN CHURCH FROM FURNISHING WATER TO NURSING HOME AND ENJOIN NURSING HOME FROM RECEIVING WATER FROM OTHER DEFENDANTS IN COMPETITION WITH CITY).

195 S.E. 2d 452-455 (Ga. 1973).

Descriptors: *Georgia, *Public utilities, *Water users, *Water distribution (Applied), Water supply, Local governments, Pulbic health, Cities, Legal aspects, Judicial decisions, Legislation.
Identifiers: Injunctive relief.

The City of Midway (City) as plaintiff brought action against the Midway Nursing and Convalescent Center asking that the defendant be enjoined from drilling its own water well, and requesting that the defendant be required to accept water from the city system. The City maintained it was acting under its police powers and as a matter of public policy to protect public health, safety and morals and that the defendant's action was designed to circumvent this policy. The court conceded that there is valid authority for the proposition that a municipal corporation may compel connection to a public drain or sewer in the exercise of its police power, but refused to accept the City's contention that this also extends to water supply. The court felt that the injunctive relief sought would lie only if the City were able to establish that some reasonable basis existed for protecting the health and welfare of the citizens in this manner. In denying relief, the court found that the City had been without authority when it passed an ordinance requiring that all residences and businesses were required to connect to the city system. (McKnight-Florida)
W74-03403

TAYLOR V. ASKEW (PROCEEDING TO CONDEMN A CARTWAY OVER LANDS OF RESPONDENTS TO CONNECT A TRACT OF TIMBLERLAND OWNED BY PETITIONERS).

195 S E 2d 316-319 (Ct App N C 1973).

Descriptors: *North Carolina, *Drainage districts, *Eminent domain, *Canals, Real property, Public access, Judicial decisions, Legislation, Legal aspects, Surface drainage.

Petitioners brought suit under a North Carolina statute to condemn a cartway over the lands of respondents in order to connect a tract of timberland owned by the petitioners with a state highway. Respondents admitted that no public roads led to the petitioners' land, but denied that petitioners lacked other adequate ways of ingress and egress. The court noted that the statute which authorizes in certain cases the condemnation of a cartway for the benefit of one landowner over the lands of his neighbor is in derogation of the rights of the owner of the land over which the cartway is to be established and therefore must be strictly construed. Thus, a petitioner is not entiteld to condemn a cartway if he presently has reasonable access to a public road. The court found that the petitioners did have adequate ingress and egress to their property in that they could build a road along the drainage district spoil bank. The court stated that the drainage district did have authority to allow construction of this road because the road would facilitate maintenance of the district's drainage canal. (McKnight-Florida)
W74-03404

FINISH ALLATOONA'S INTERSTATE RIGHT, INC. V. VOLPE (SUIT TO ENJOIN CONSTRUCTION OF LAST SEGMENT OF HIGHWAY 1-75 ACROSS PORTION OF PUBLICLY OWNED LAKE).
355 F Supp 933-938 (N D Ga 1973).

Descriptors: *Public lands, *Highway relocation, *Highway effects, Clean Air Act, Environmental effects, Lakes, *Georgia, Judicial decisions, Ecology, Legal aspects.
Identifiers: Expressways, Location, Public land protection, Transportation.

Plaintiff corporation filed suit to enjoin the construction of Interstate Highway 75 in the vicinity of a nearby lake which is operated as a flood control, hydroelectric and recreational facility. The state submitted a proposed route across the lake. The state prior to approval of the route prepared a comprehensive environmental impact statement. The defendant, Secretary of Transportation, likewise prepared a detailed report treating various alternatives for the location of 1-75. The Secretary in that report concluded that there was no prudent alternative to the proposed route. The plaintiff submitted an alternative which it contended would be more environmentally sound. Plaintiff based its action on the contention that defendant conspired to spend federal funds to construct 1-75 in violation of federal law which required non-approval of a transportation project which requires use of publicly owned land from a public park, recreational area or wildlife refuge unless there is no feasible alternative. The court held that the district court made no clear error of judgment in that all necessary procedural steps had been followed and also found that there was no violation of the Clean Air Act. The construction was therefore allowed to commence. (Daniels-Florida)
W74-03405

PEOPLE OF SAIPAN V. UNITED STATES DEPT. OF INTERIOR (ACTION TO ENJOIN CONSTRUCTION OF HOTEL ON PUBLIC LAND UNTIL ENVIRONMENTAL IMPACT OF HOTEL HAS BEEN EVALUATED).

356 F Supp 645-660 (D Hawaii, 1973). 16 p.

Descriptors: *Governmental interrelations, *Environmental effects, *Ecology, *Pacific Ocean, Federal government, United States, Adjudication procedure, Legislation, Atolls, Public rights, Legal aspects, Leases, Administrative agencies, Governments, Reefs.
Identifiers: *National Environmental Policy Act, *Environmental impact statement, *Injunctive relief, *Sovereign immunity, *Standing (Legal).

Plaintiff sought to enjoin construction of a hotel on public land leased on Saipan Island until environmental impact survey had been made. Local people felt they would be deprived of the use of the beach nearby and the project would strain over-burdened utilities and damage the ocean and reef. The High Commissioner of the Territory approved the lease. Plaintiff contended the National Environmental Policy Act (N.E.P.A.) was applicable to Trusteeship officials and noncompliance called for review by the court under the Administrative Procedure Act (A.P.A.). Defendant Commissioner and developer argued the inapplicability of N.E.P.A. and the plaintiff lacked standing. The court held N.E.P.A. applicable to U.S. governmental agency activity in a Trusteeship but not to the Trusteeship government which is exempt from review under the A.P.A. Non-resident aliens have standing to sue under N.E.P.A. when they allege an adverse effect to their use of a public area. Approval of the lease by the Trusteeship government was not a federal action but was a major action within the meaning of N.E.P.A. However, plaintiff's suit was dismissed due to the inability of the court to review the actions of the trust government. (Wehby-Florida)
W74-03406

UNITED STATES V. PENNSYLVANIA INDUSTRIAL CHEMICAL CORP. CORPORATION WAS CONVICTED OF DISCHARGING REFUSE INTO NAVIGABLE WATERS IN VIOLATION OF RIVERS AND HARBORS ACT OF 1899, AND IT APPEALED).

461 F 2d 469 (1973). 14 p.

Descriptors: *Pennsylvania, *Rivers and Harbors Act, *Permits, *Navigable rivers, *Liquid wastes, Legal aspects, Navigable waters, Wastes, Navigation, Aqueous solutions, Suspension, Suspended bodies, Industrial wastes, Chemical industry.
Identifiers: *Monongahela River, Navigation obstructions.

Defendant corporation was convicted in the District Court of discharging refuse into the Monongahela River without a permit. The Third Circuit reversed, holding that a defense would exist if defendant could prove that no permit program existed at the time of discharges in question or if a permit program existed but a Corps of Engineers affirmatively misled defendant into believing that a permit was not necessary in its situation. Defendant's conduct was alleged to be a violation of the Rivers and Harbors Act of 1899 (Act). The court stated that the Act applies to all discharge of refuse into navigable waters and not merely that which may impede navigation. It is no defense that solids discharged were in solution rather than suspension nor is it a defense that defendant complied with water quality standards of later enactments. Liquid industrial waste flowing through defendants own pipes into navigable waters was not within exception for refuse flowing from streets and sewers in a liquid state. It may have violated due process to hold defendant criminally responsible for activities which could not reasonably have been anticipated to be illegal based on 70 years of consistent government interpretation of the Act as prohibiting only discharges which impeded navigation. (Sears-Florida)
W74-03407

CAMP V. MILAM (ACTION TO FORCE NON-LAKE-FRONT OWNER TO REMOVE BOATHOUSE FROM LAKE SHORE).

277 So 2d 95-101 (Ala 1973). 7 p.

Descriptors: *Alabama, *Artificial lakes, *Easements, *Lake shores, Dams, Permits, Recreation, Judicial decisions, Public access, Real property, Legal aspects.
Identifiers: *Injunctive relief, *Licenses.

Plaintiff had entered an agreement with defendant some time in the past by which defendant would construct a dam on plaintiffs' artificial lake in return for a parcel of land and the right to use the lake. The defendant did construct the dam and the plaintiff conveyed to the defendant a non-lake-front tract of land on which the defendant constructed a home. The defendant later constructed a boathouse on land owned by the plaintiff, but with the plaintiffs' knowledge and consent. When relations between the plaintiff and defendant became strained, the plaintiffs brought suit, asking the court to force the defendant to remove the boathouse and also requesting the court to declare that the plaintiffs had sole and exclusive rights to the use of the lake and that the defendant had no interest therein. The court rejected both the argument of the plaintiff that a mere revocable license had been granted and the contention of the defendant that an easement had been created, finding instead that the defendant possessed an irrevocable license for the reasonable use of the lake commensurate with its size and nature and as originally contemplated and intended by the parties. (McKnight-Florida)
W74-03408

FLOOD CONTROL.

N J Stat Ann secs 58:16A-50 to 58:16A-66 (1972).

Descriptors: *Flood protection, *Flood data, *Flood plain zoning, *Flood plains, Legislation, State government, Governmental interrelations.
Identifiers: Administrative regulations, Notice.

The Division of Water Resources is empowered to mark flood hazard areas, and the Department of Environmental Protection (Department) is authorized to adopt land use regulations for the floodway and to coordinate effectively the development, dissemination, and use of information on floods and flood damages that may be available. The Department is authorized to adopt, amend, and repeal rules concerning the development and use of land in any designated floodway which shall be designed to preserve its flood carrying capacity and to minimize the threat to the public safety, health and general welfare. Within twelve months after the promulgation of standards by the Department, affected municipalities shall adopt rules and regulations which at least conform to the standards promulgated by the Department. No rules or regulations adopted by the Department are effective until the Department has conducted public hearings, and rules promulgated do not apply to the extent that lands affected thereby are regulated pursuant to the Wetlands Act of 1970. Persons violating the rules adopted are subject to fine, and if the violation is of a continuing nature, each day constitutes a separate offense. (McKnight-Florida)
W74-03410

SEWERAGE DISTRICTS AND SEWERAGE DISTRICT BOARDS.

N J Stat Ann secs 58:12-2 through 58:12-4.1 (1972).

Descriptors: *Sewage districts, *New Jersey, *Waste water (Pollution), *Water pollution treatment, *Sewage treatment, Legislation, Sewage effluents, Sewage systems, Wastes, State, Governments.
Identifiers: *Administrative regulations, Injunctive relief, Notice.

The State Department of Environmental Protection (Department) is charged with investigating the various methods of sewage disposal as to be able to make recommendations in regard thereto, requiring necessary alterations of sewage treatment works, investigating complaints of pollution of the waters of the state and inspecting the waters of the state. If the Department finds that any of the waters are being polluted, it shall notify the party polluting such waters in writing and order such pollution to cease. Any person aggrieved by such an order is entitled to a hearing. Plans for any new sewage treatment facility shall be submitted to the Department for approval and in considering such plans the department shall give due consideration to community development of comprehensive regional sewage facilities in order to be assured insofar as is practicable that all proposed sewage works shall conform to reasonably contemplated development of comprehensive sewage facilities. Violations are subject to a fine, with each day of continuing violation constituting a separate and distinct violation. (McKnight-Florida)
W74-03411

STATE ASSISTANCE FOR LOCAL GOVERNMENT.

N J Stat Ann secs 26:2E-1 to 26:2E-11 (1972).

Descriptors: *New Jersey, *Sewerage, *Sewage disposal, Domestic wastes, Legislation, Government finance, Research and development, Water resources development, State governments, Planning.
Identifiers: Administrative regulation.

The purpose of the statute is to encourage and support the promotion, planning, development and construction of public sanitary sewerage facilities, including sewerage collection, transmission, treatment, and disposal works on a regional basis. The State Commissioner of Health (Commissioner) may make grants to local government units for the preparation of feasibility studies on the future collection, treatment and disposal of sewage in such unit, or on the extension of existing facilities now operated by the unit. The Commissioner may make loans to any local government unit for the preparation of engineering plans for the construction of a new or the expansion of an existing sewerage facility. For the purpose of funding these loans, a State Sewerage Facilities Loan Fund is established which shall be administered by the State Treasurer. The Commissioner is also authorized to make grants to municipalities to assist in the construction of water pollution control projects. A Clean Water Council is created, and its duties include advising the Commissioner as to matters relating to the preservation and improvement of water and holding public hearings in regard to existing water pollution control statutes. (McKnight-Florida)
W74-03412

WATER POWER.

N Y Sess Laws, Ch 664, Sess 15-1701 through 15-1751 (McKinney 1972).

Descriptors: *Water control, *Permits, Navigable waters, Water works, Eminent domain, Water flow, Ownership, Legislation, New York, State jurisdiction, Legal aspects.

Where any person takes, diverts or otherwise uses the waters of the state over which the state has the proprietary ownership of the flow, such water shall remain subject to the power and control of the state for the purposes of regulating, licensing, controlling and terminating the use and disposition of the same. This title makes provisions for licensing procedures with conditions and provides for the protection of navigable waters. There are also provisions for rental charges, maintenance of project works, eminent domain proceedings, contract extension, and revocation of licenses. The state reserves the right to amend and appeal the licenses and legislation. (Daniels-Florida)
W74-03413

SOAP AND DETERGENT ASSOCIATION V. CITY OF CHICAGO (DECLARATORY ACTION

TO SET ASIDE CITY ORDINANCE PROHIBITING SALE OF PHOSPHATE DETERGENTS).
357 F Supp 44-51, (N D Ill, E D 1973). 8 p.

Descriptors: *Environmental control, *Detergents, *Water pollution, *Illinois, Legislation, Ordinances, Water policy, Interstate, Phosphates, Water pollution sources, Water supply, Waterways, Regulation, Judicial decisions, Public health, Municipal wastes.
Identifiers: City ordinances, Interstate commerce.

Plaintiffs, detergent manufacturers, sought to set aside a city ordinance making it a criminal offense to sell detergents containing phosphorus within the city. The ordinance was adopted by the city on the recommendation of its Committee on Environmental Control after public hearings were held. Plaintiffs contended that such detergents were useful and harmless and thus the city's ordinance was an unreasonable and unjustifiable interference with their distribution and sale of these products in interstate commerce. The city contended that the ordinance was justified in order to protect the local waterways and the city's water supply. It contended that phosphates accelerate the natural eutrophication of the water and are unreasonably expensive to remove by sewage treatment. The court held that local governments do have right to enact laws for the protection of the public, but must show sufficient necessity for the health, safety, or welfare of the local citizenry. The defendant city failed to demonstrate such necessity and thus the ordinance constituted an unjustifiable interference with interstate commerce. (Daniels-Florida)
W74-03414

RUCKER V. WILLIS (CLASS ACTION SEEKING TO ENJOIN CONSTRUCTION OF PROPOSED MARINA AND PIERS).

358 F Supp 425-430 (ED NC 1973). 6 p.

Descriptors: *North Carolina, *Environmental effects, *Construction, Water permits, Environmental control, Water quality, Judicial decisions, Governmental interrelations, Engineering structures, Shore protection, Marinas, Recreation facilities.
Identifiers: Environmental Impact Statements.

Plaintiff, private individual, sought to bring a class action to enjoin defendant federal agencies and private landowner from constructing a proposed marina and piers in the surrounding ocean and sound. Private defendant, prior to construction, filed for a permit with the United States Army Corps of Engineers. Public notice of application was made and copies were furnished to federal and state agencies, environmental organizations, and other interested persons. The Environmental Protection Agency, which is responsible for water quality, did not respond to the public notice, and thus it was decided that no environmental impact statement was needed. The essence of private plaintiff's claims are (1) that federal defendant failed to file impact statement as required, and (2) that the permits issued were arbitrary exercises of governmental authority, therefore the permits were issued illegally. The court found that the decision of the district engineer in not requiring the environmental impact statement was not arbitrary or capricious when his decision was based on fact that no federal or state agency certified that such permit would have adverse environmental effects. Also, the case is not a major federal action affecting the quality of the human environment. Thus no impact statement was required and the project could proceed. (Daniels-Florida)
W74-03415

U.S. V. JOSEPH G. MORETTI, INC. (LAND FILLS DEEMED 'STRUCTURES' UNDER RIVERS AND HARBORS ACT OF 1899).

478 F 2d 418-433 (5th Cir 1973). 16 p.

Descriptors: *Navigable waters, *Rivers and Harbors Act, *Structures, *Land fills, *Environmental effects, Land development, Land use, Environmental control, Permits, Obstruction to flow, Barriers, *Florida.

The plaintiff, U.S. Government, brought an action for injunctive relief restraining defendant land developers from dredge and fill work in the Florida Bay under the Rivers and Harbors Act of 1899 (Act) which forbids the creation of obstructions in, or alterations of the features of the navigable waters of the United States without permission of the Secretary of the Army. Defendant, after filing for an after-the-fact permit to legalize work already done, began new construction before approval or denial of such permit. Defendant claimed that the Act only grants the district court authority to cause the removal of 'structures' from 'navigable' waters and that his land fill was not a 'structure'. The court of appeals held that the construction of land fills in Florida Bay constituted an obstruction of navigable waters and that such fills were 'structures' subject to removal pursuant to mandatory injunction for failure to secure authorization. The court further held that the issuance of a mandatory injunction requiring extensive restoration was within the District court's power pending the final decision and processing of defendant's application for an after-the-fact permit. (Daniels-Florida)
W74-03416

KINGS COUNTY ECONOMIC COMMUNITY DEVELOPMENT ASSOCIATION V. HARDIN (PAYMENT OF FARM SUBSIDIES DO NOT REQUIRE NEPA APPROVAL).
478 F 2d 478-481 (9th Cir 1973). 4 p.

Descriptors: *Water pollution, *Impaired water quality, *Agricultural chemicals, *Public health, *Government supports, California, Federal Water Pollution Control Act, Pollution abatement, Fertilizer, Nitrates, Judicial decisions, Legislation, Pest control, Water wells.
Identifiers: National Environmental Protection Act.

Plaintiffs, an unincorporated association of low income persons and individuals representing a class of hand-harvest farm workers brought suit against federal officials to require them to take action in control of water pollution caused by agricultural water users. The plaintiff's members could not afford to purchase bottled water and filter and accordingly were forced to use high-nitrate water from wells in the vicinity of Delano, California. The plaintiff's action was based on the National Environmental Policy Act (NEPA) and the Federal Water Pollution Act and was aimed at denying farm subsidies and loans to users of pesticides and fertilizers. The Court of Appeals affirmed the denial of relief in that the relief sought was directed at private rather than public action. The court refused to find the payment of farm subsidies a major federal action significantly affecting the quality of the human environment, which is the prerequisite for the application of NEPA. The court based this on the fact that under the Agricultural act of 1970 the recipient is free to use the money in any way he sees fit and the fact that it was put to a use affecting the environment cannot convert that private use into federal action. (Gragg-Florida)
W74-03417

WILD, SCENIC AND RECREATIONAL RIVERS SYSTEM.

N Y Sess Laws, Ch 869, secs 429-K through 429-V, (McKinney 1972).

Descriptors: *New York, *Recreation, *Water utilization, *Legislation, *Social aspects, Conservation, Water resources development, Scenery, Wild rivers, Water policy protection, Rivers.

The State of New York has established a state wild, scenic and recreational rivers system. Certain selected rivers and their immediate environs will be protected for the benefit and enjoyment of present and future generations. The rivers to be included in the system are divided into three classes with differing criteria for inclusion and differing management objectives. Wild rivers or sections of rivers are those that are free of diversions and impoundments, and which are inaccessible to the general public except by water, foot or horse trail. Scenic rivers or sections of rivers are those that are free of diversions or impoundments except for log dams, with limited road access and with river areas largely primitive and largely undeveloped. Recreational rivers are those that are readily accessible by road or railroad and that may have development in their river area. The Act goes on to enumerate certain rivers to be included in the system and to provide for procedures to add rivers to the system. (Gragg-Florida)
W74-03418

AMERICAN FALLS DAM, UPPER SNAKE RIVER PROJECT, IDAHO.
Hearing--Subcomm on Water and Power Resources--Comm on Interior and Insular Affairs--United States Senate, 93d Cong, 1st Sess, May 10, 1973. 206 p, 2 photo, 1 chart.

Descriptors: *Legislation, *Dam construction, *Idaho, *Structural behavior, *Federal Reclamation Law, Dam failure, Interstate river, Hydraulics, Dams, Water supply, Reservoirs, Safety factors, Construction materials, Structural stability.
Identifiers: Congressional hearings.

This hearing before the Subcommittee on Water and Power Resources of the Committee on Interior and Insular Affairs of the United States Senate was for the purpose of taking testimony on two bills which would authorize the construction of a replacement for the existing American Falls Dam. This dam is a component of the Minidoka Reclamation project in southeastern Idaho. Due to structural deterioration, the dam fails to meet current safety standards and severe restrictions have had to be imposed upon the amount of water which can be stored in the reservoir. The hearing involved two alternative bills, one which authorizes the Secretary of the Interior to construct a replacement dam under the reclamation program and a second bill that provides for a plan in which the water users would finance and construct a replacement dam without federal assistance. The subcommittee heard statements from various members of the Idaho Congressional delegation, residents of Idaho, representatives of power companies and numerous other interests. (Gragg-Florida)
W74-03419

THE NATION'S ESTUARIES: SAN FRANCISCO BAY AND DELTA, CALIFORNIA.
For primary bibliographic entry see Field 05G.
W74-03420

CITY OF CHAMPAIGN V. ENVIRONMENTAL PROTECTION AGENCY (ADMINISTRATIVE PROCEEDING FOR ALLEGED POLLUTION AGAINST CITY, UNIVERSITY BOARD OF TRUSTEES AND OTHERS).

299 N.E.2d 28-32 (Ill. App. Ct. 1973). 5 p.

Descriptors: *Water pollution sources, *Judicial decisions, *Water pollution control, *Pollution abatement, *Municipal wastes, *Illinois, Water quality, Discharge, Wastes, Powerplants, Universities.
Identifiers: Environmental Protection Agency.

A procedural dispute involved an order of the Illinois Pollution Control Board (Board) which was originated by the Environmental Protection Agency against the cities of Champaign and Urbana. The city allowed water pollution on certain dates by permitting contaminants to enter Boneyard Creek. The City filed a third party complaint against the University of Illinois charging it with contributing to the pollution through the operation of a power plant. The Board found that a pollutional discharge had occurred and ordered both the City and the University to file a report containing a program detailing the corrective measures to be taken to stop the pollution. The court vacated the order as it applied to the University in that it was not proved that it was responsible for any pollution. The order as to the City was vacated and remanded. The dissent would have dismissed for want of a final appealable order. Its contention was that the Board's order was not final. (Gragg-Florida)
W74-03421

CHARLES V. DIAMOND (EXTENT TO WHICH POLICE POWERS MAY BE USED TO DISADVANTAGE INTERESTS IN PRIVATE PROPERTY).

345 N.Y.S.2d 764-768 (App. Ct. N.Y. 1973). 5 p.

Descriptors: *Water pollution, *Water pollution control, *Municipal wastes, *New York, Judicial decisions, Sewage, Sewage treatment, Water pollution sources, Legal aspects, Administration, Local governments, Constitutional law.
Identifiers: Injunctive relief.

The petitioner, a landowner, wished to construct an apartment building. He challenged the right of the New York State Department of Environmental Conservation (Department) to enjoin the new extensions of the Village of Camillus' sewer system. The Department issued its non-extension order in 1966 because the municipal sewage outlet discharged pollutants into a creek. The order also required that the Village take immediate steps to plan construction of a treatment facility. The Village had taken no steps to construct treatment facilities. The petitioner alleged that the actions of the respondent resulted in the unconstitutional confiscation of his property. The court was swayed by the fact that the Village had taken no action nor had the Department attempted to force compliance. It found that this exercise of the police power went too far and resulted in a taking. (Gragg-Florida)
W74-03422

COMMONWEALTH, MARINE RESOURCES COMMISSION V. FORBES (SUIT BY STATE ALLEGING DEFENDANTS, WITHOUT AUTHORITY, HAD DEPOSITED FILL UPON STATE OWNED SUBAQUEOUS BEDS OF RIVER; PRAYING FOR INJUNCTIVE RELIEF).

197 S.E.2d 195-200 (Va. 1973). 6 p.

Descriptors: *Legislation, *Riparian rights, *Riparian land, *Virginia, Judicial decisions, Permits, Landfill, Beds, Legal aspects, Water rights, Water law, Ownership of beds, Severance.
Identifiers: Subaqueous beds, Injunctive relief.

The Commonwealth of Virginia was denied an injunction by which it sought to stop defendants from depositing fill upon state owned subaqueous beds. The Commonwealth appealed. The defendants were depositing fill which had been severed from the appurtenant highland in accordance with their riparian rights. Such severance and alienation as separate property is allowed in Virginia. The problem centered on the interpretation of a state statute which creates a right that did not exist at common law, viz., the right to fill subaqueous beds by riparian owners. The Supreme Court of Virginia said that the statute only conferred the new right to fill upon the owner of highland with riparian rights appurtenant thereto. The court, however, recognized that if the same party owned the severed rights and the appurtenant land as two separate pieces of property that they would merge to revive the fee simple absolute. The court remanded for further factual determination. (Gragg-Florida)
W74-03423

CAMPAIGN CLEAN WATER, INC. V. RUCKELSHAUS, (ACTION BROUGHT AGAINST ADMINISTRATOR OF ENVIRONMENTAL PROTECTION AGENCY CHALLENGING IMPOUNDMENT WITH RESPECT TO FUNDS AUTHORIZED TO BE APPROPRIATED BY CONGRESS).

361 F. Supp. 689-701 (E.D.Va. 1973). 13 p.

Descriptors: *Virginia, *Judicial decisions, *Water Quality Act, *Federal Water Pollution Control Act, Wastes, Waste treatment, Water law, Legislation, Water pollution, Legal aspects, Water pollution control, Water pollution effects, Water policy, Governments.
Identifiers: Sovereign immunity, Environmental Protection Agency, Impoundment.

Plaintiff, an environmental group, challenged the Administrator of the Environmental Agency (EPA) for impoundment of funds appropriated by Congress under the Water Pollution Control Act (Act). The plaintiff alleged injury as a result of waste contamination in Virginia's waters and that such contamination is directly attributable to inadequacy of waste treatment plants. These plants were to be replaced or improved with federal money which has been impounded. The case was highly procedural in nature. The court was faced with the questions of standing, mootness, sovereign immunity, and whether a justiciable case or controversy was present. Having answered these questions affirmatively the court then examined the merits of the complaint. After a review of the legislative history of the Act, the court found that although the Act provided for discretion, such discretion only applied to the actual expenditure and not to the allotment. The court gave the EPA ten days to conform the administration of the program to this decision. (Gragg-Florida)
W74-03424

CAPE HENRY BIRD CLUB V. LAIRD (ACTION FOR INJUNCTIVE AND DECLARATORY RELIEF, ON ENVIRONMENTAL GROUNDS, AGAINST FEDERAL DAM PROJECT).

359 F. Supp. 404-423 (W.D. Va. 1973). 20 p.

Descriptors: *Dams, *Flood control, *Water quality control, United States, Legislation, Project, Flood Control Act, Environmental effects, Legal aspects, Judicial decisions.

This action sought injunctive and declaratory relief on environmental grounds against a federal dam project. The principal purposes of the dam are flood and water quality control. The plaintiff environmentalists alleged that the federal defendants failed to comply with federal statutes and therefore their actions were illegal because the decision was arbitrary and capricious. Defendants asserted that they fully complied with all the applicable laws especially those concerning adequate environmental protection. The court held that, with respect to the dam project authorized by the Flood Control Act, the National Environmental Protection Act rather than itself being a deciding factor, is to be used only to enable the court to determine whether all environmental factors have been given full and adequate consideration. The court further stated that the project could not be halted simply because costs involved might exceed benefits derived. The injunction was therefore denied. (Daniels-Florida)
W74-03425

U.S. V. REYNOLDS METALS COMPANY (CORPORATE IMMUNITY FOR POLLUTION UNDER RIVERS AND HARBORS ACT OF 1899),
359 F. Supp. 338-339 (S.D. Texas 1973). 2 p.

Descriptors: *Judicial decisions, *Rivers and Harbors Act, *Discharge, *Pollution abatement, *Oil pollution, Law enforcement, *Texas, Legislation, Navigation, Water Quality Act, Federal Water Pollution Control Act, Water law, Oil wastes, Water pollution, Channels, Penalties.

The defendant, Reynolds Metals Company, was found guilty of violating the Rivers and Harbors Act of 1899 by discharging into a navigable waterway, the La Quinta Ship Channel, a quantity of oil from a shore facility. The court overruled the defendant's motion to suppress all evidence which stemmed from notification of the oil spill given by an employee of the defendant. The motion was predicated on the provisions of the Federal Water Pollution Control Act which require persons in charge of an on-shore facility to immediately report discharges of oil into the surrounding water to the appropriate federal agency. The provisions protect any such person from the use of such notification or information obtained by exploration thereof in any criminal matter. Based upon a later case at a higher level which held that a corporate owner operator was within the immunity granted by the Water Pollution Control Act the defendant was granted a new trial although the district court was reluctant in that if immunity lies, the Rivers and Harbors Act will be emasculated. (Gragg-Florida)
W74-03426

U.S. V. STOECO HOMES, INC. (PERMANENT RESTRAINING ORDER ENJOINING DEVELOPER FROM CONDUCTING DREDGE, FILL AND CONSTRUCTION OPERATIONS).
359 F. Supp. 672-680 (D. N.J. 1973). 9 p.

Descriptors: *Dredging, *Navigable waters, *Judicial decisions, *Permits, *Harbors, Environmental effects, Lagoons, Bays, Excavation, Landfill, *New Jersey, Construction, Inland waterways, Constitutional law, Legal aspects.
Identifiers: Injunctive relief, Fill permits.

The United States brought an environmental protection action for a permanent restraining order enjoining a New Jersey developer from conducting dredge, fill and construction operations. The government contended that the area of development is part of the navigable waters of the United States and that the defendant had conducted its operations without the prior approval of the Army Corps of Engineers. The defendant responded that its activities were not within navigable waters. Alternatively it contended that even if the waters are navigable, it did not violate federal law because its operations were conducted in an area shoreward of federally established or approved New Jersey State harbor lines, where, it further alleged, a permit is not required. The defenses of estoppel and laches as well as an unconstitutional violation of equal protection in the inconsistent enforcement of the statutes were also asserted. The United States District Court found the area in question to be within navigable waters and after considering each defense found them to be without merit. It entered an order permanently enjoining any further activity on the part of the developer. (Gragg-Florida)
W74-03427

OPAL LAKE ASSOCIATION V. MICHAYWE'LIMITED PARTNERSHIP (ACTION BY ASSOCIATION COMPOSED OF RIPARIAN OWNERS AGAINST LAND DEVELOPMENT COMPANY FOR INJUNCTION TO HALT DEVELOPMENT OF CLUB ON

COMPANY-OWNED SHORELINE).

209 N.W.2d 478-486 (Michigan 1973). 9 p.

Descriptors: *Judicial decisions, *Riparian rights, *Reasonable use, *Remedies, *Lakes, Recreation, Lake shores, Construction, Water law, Riparian land, Equity, *Michigan, Building, Legal aspects, Riparian waters.
Identifiers: Injunctive relief.

This action, by an association composed of riparian owners, sought an injunction to stop a land development company from constructing a club on shoreline owned by the developer. Both the defendant and all but two of the plaintiff association's members own riparian land on a small lake. The development plans include residential lots, condominium units and mobile home sites as well as a recreation club on the lake to which all parties purchasing property in the development will be given membership. Based on the rule that on an inland lake where there are several riparian owners, such proprietors and their lesses and licensees may use the surface of the lake so long as they do not interfere with the reasonable use of the waters by other riparian owners, the lower court fashioned a tailored injunction. It restricted the number of people and boats that the club could allow on the lake. The Court of Appeals of Michigan, although agreeing the court could grant the injunction, reversed and remanded for further consideration due to the difficulty of enforcing the present injunction. (Gragg-Florida)
W74-03428

JEFFERSON NATIONAL BANK AT SUNNY ISLES V. METROPOLITAN DADE COUNTY (SUIT SEEKING DECLARATORY JUDGMENT WITH RESPECT TO FILL PLACED IN BAY BY PLAINTIFFS).

271 So. 2d 207-214 (D.C.A. Fla. 1972).

Descriptors: *Florida, *Landfills, *Riparian rights, *Navigable waters, *Bulkheads, Retaining walls, Coastal structures, Legislation, Legal aspects, Judicial decisions.
Identifiers: *Coastal waters, *Injunctive relief.

Plaintiff owned subdivision lots which fronted on Bella Vista Bay, a navigable body of water which connects with the Intracoastal Waterway in Dade County. Plaintiff extended its property into the Bay by the use of fill. When Metropolitan Dade County (County) learned of the fill, the County informed the plaintiff that the filling had been done without the requisite permit and that construction outside the official bulkhead line was impermissible. The plaintiff then brought action against the county asking the court to declare it the rightful owner of the filled land and praying for a mandatory injunction to require the defendant county to issue a permit for the construction of a retaining wall for said filled in land. The court found that absent a permit, the plaintiff was absolutely precluded from extending its property beyond that point, stating that the riparian right of the plaintiff did not confer upon it any ownership interest in the waters of the Bay. Thus the relief sought was denied and the fill was subject to removal. (McKnight-Florida)
W74-03429

HARBORS AND WATER-COURSES.

Ind. Ann. Stat. secs 48-5208 thru 48-5219 (Supp. 1972).

Descriptors: *Indiana, *Legislation, *Harbors, *Condemnation, *Right-of-way, Water conveyances, Supply, Transfer, Water distribution, Water supply, Legal aspects, Water utilization, Eminent domain.

These are the Indiana Annotated Statutes dealing with condemnation proceedings for harbors and water-courses. The statutes provide that whenever the board of public works or public trustees of any town situated upon or adjoining any harbor connected with a navigable stream or lake, or upon any navigable channel, slip, waterway or watercourse, shall desire to appropriate or condemn for the use of such city or town any property, real or personal, for a right-of-way for any sea walls or docks or other improvements of such harbor, it shall adopt a resolution to that effect, describing the property which may be injuriously or beneficially affected. Thereafter, all proceedings necessary in order to effect the completion of and payment for any such undertaking, including notice, appeal, letting of and performance of contracts, assessment and collection of payment for benefits as well as the determination and payment of damages to property, shall be the same to the extent applicable as that for proceedings for street improvements of any such city or town by its board of public works or town trustees, as the case may be. (Mockler-Florida)
W74-03430

WATER LAW OF SOUTHEASTERN ESTUARIES,
C. B. Leavell.
Completion Report, June 21, 1972, 4 p. OWRR B-030-GA (2) 14-31-0001-1890.

Descriptors: *Legal aspects, *Estuaries, *Water law, Boundaries, Public rights, Riparian rights, Prescriptive rights, Submerged lands act, Legislation, Tidal waters, Southeast U.S., Georgia, South Carolina.

The most significant findings of the research concerning Georgia and South Carolina are the result of bringing together the various legal doctrines which control ownership and rights in estuarine areas. Summaries of these findings of existing law, which it is felt can be best understood if read with the background material explaining their development, are included in the body of the study (See W72-04348). Conclusions reached from the survey of statutory controls in both states indicate that neither state has multi-purpose estuarine area legislation. In Georgia regulatory control of the estuarine areas consists primarily of permit regulation of coastal marshlands. And in South Carolina statutory authority in the area is scattered among a number of agencies with differing and often conflicting powers and goals.
W74-03463

A PLANNING MODEL FOR A WATER QUALITY MANAGEMENT AGENCY,
SDL Inst., Toronto (Ontario).
For primary bibliographic entry see Field 05G.
W74-03469

RESOURCE ALLOCATION, INFORMATION COST AND THE FORM OF GOVERNMENT INTERVENTION,
California Inst. of Tech., Pasadena. Environmental Quality Lab.
For primary bibliographic entry see Field 05G.
W74-03485

USEFUL WATERS FOR CALIFORNIA.
California State Water Resources Control Board, Sacramento.
For primary bibliographic entry see Field 05G.
W74-03504

MERCURY POLLUTION AND ENFORCEMENT OF THE REFUSE ACT OF 1899 (PART 2).
For primary bibliographic entry see Field 05G.
W74-03558

SELECTED LEGAL AND INSTITUTIONAL ASPECTS OF THE TEXAS COASTAL ZONE.
Texas Law Inst. of Coastal AND Marine Resources, Houston.

Summary report prepared for Texas Interagency Council on Natural Resources and the Environment. March, 1973. 8 p.

Descriptors: *Legal review, *Water law, Repulsion (Legal aspects), Right-of-way, Water riparian rights, Water rights, Coasts, Navigation, *Texas, Gulf of Mexico.
Identifiers: *Coastal-related legal matters, Texas coastal law.

Five studies on coastal-related legal matters are summarized. The proceedings of the conference 'The Beaches: Public Rights and Private Use,' include discussions on the Texas Open Beach Act, one of the nation's earliest and most precise statutory definitions of public beaches which was the model for the National Open Beaches Bill. Inherent disadvantages of the bill are listed. 'Legal Assurance of Adequate Flows of Fresh Water into Texas Bays and Estuaries' first analyzes four segments of law to determine their capacity to provide estuarine protection and then specifies different methods of implementation. 'Texas Seashore Boundary Law: The Effect of Natural and Artificial Modifications' examines the need for a greater clarification of the delineation of property lines due to the shiftings of the seashore boundary. Recommendations for legislative action are made. In exploring two major policy questions concerning Texas navigation districts, the study 'Texas Navigation Districts and Regional Planning in the Texas Gulf Coast Area,' concludes that (1) navigation districts should not be given primary responsibility for regional planning in the Texas Gulf Coast Area and (2) navigation districts should be subject to the same land use and environmental controls as other public and private entities. In 'Summary of Principal Regulations of Activities Affecting Texas Bays and Estuaries--a Preliminary Assessment,' a chart is described which identifies activities which are apt to result from development in various coastal economic sectors and the corollary governmental agencies having the power to regulate these activities. (Hoffman - North Carolina)
W74-03630

METROPOLITAN DEVELOPMENT GUIDE: PROTECTION OPEN SPACE--POLICY PLAN, PROGRAM.
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 06G.
W74-03635

RESPONSIBILITIES OF LOCAL AUTHORITIES FOR WATER POLLUTION CONTROL.
For primary bibliographic entry see Field 05G.
W74-03639

WATER AND SEWER STUDY: PART 2 PLANS AND PROGRAMS, SUMMARY REPORT BUNCOMBE COUNTY, NORTH CAROLINA.
Register and Cummings, Asheville, N.C.
For primary bibliographic entry see Field 05G.
W74-03645

PUBLIC WORKS FOR WATER AND POWER DEVELOPMENT AND ATOMIC ENERGY COMMISSION APPROPRIATION BILL, 1974, PARTS 1 AND 2.

Hearings--Subcomm of the Committee On Appropriations--United States House of Representatives, 93d Cong., 1st sess., February 26, 1973. 2457 p.

Descriptors: *Federal government, *Administrative agencies, *Water resources development, *Legislation, *Navigation, Channel improvement, Dredging, Excavation, Wastewater (Pollution), Wastewater disposal, Wastewater treatment, Environmental engineering, Navigable waters, Water pollution, Water pollution control, Permits, Wastes.
Identifiers: Congressional hearings.

These hearings were concerned with the civil works appropriation request of the Corps of Engineers for fiscal year 1974. Extensive testimony was presented by representatives of the Corps of Engineers in support of their request, outlining the ongoing projects in need of continued funding and new projects for which funding was requested. Among the projects about which testimony was given were: research into the problem of wastewater management for urban areas; investigation of deepwater ports adaptable to supersized vessels; and the responsibilities of the Corps under the Federal Water Pollution Control Act of 1972. There was also testimony about the Corps of Engineers' dredging activities as well as their regulation of dumping into navigable waters. Maps and charts were included to illustrate the activities of the Corps in each of its divisions throughout the country and the costs of the various projects being conducted. The figures and the testimony were in support of the amount requested. (Flowers-Florida)
W74-03710

EPA POLLUTION REGULATIONS AND FUEL SHORTAGE: THE IMPACT ON MASS TRANSIT.
For primary bibliographic entry see Field 05G.
W74-03711

CRIMINAL OFFENSES--POLLUTION).

Tenn. Code Ann., sec. 39-2204 through 39-2206 (1932).

Descriptors: *Tennessee, *Penalties (Legal), *Water pollution abatement, *Administration, *Legislation, Pollutant identification, Water supply, Structures, Water pollution, Public health, Law enforcement, Water pollution control, Municipal water, Water quality control, Water quality act, Water works.

Criminal penalties are provided for violation of pollution laws and, more specifically, pollution of water in various ways. Throwing dead animals into any spring, well, cistern, or running stream of water, or willfully injuring pumps, reservoirs, tanks, etc. which supply water for domestic or manufacturing are declared to be misdemeanors. This statute applies to government structures as well as private or commercial waterworks and provides for the allocation of any fines collected. (Sutton-Florida)
W74-03722

ZONING--SUBDIVISION OF LAND.
Conn. Gen. Stat. Ann., sec. 8-25 (Supp. 1972).

Descriptors: *Connecticut, *Sewage, *Sewage disposal, *Flood control, *Drainage, Water, Water pollution, Drainage Systems, Water pollution treatment, Legislation, Zoning, Land use, Project planning.

Land subdivision must be approved by the commission prior to subdivision of land and all plans filed with the town and/or district clerk's office. The commission is required to adopt regulations pursuant to this section prior to exercising the powers granted. The regulations must provide that the land be of a character that will not endanger health or public safety, and proper provision must be made for water, drainage and sewerage. They must also provide for controls of water subject to flooding, and streets and throughfares must form an adequate and convenient system for present and prospective traffic needs. There must be provisions for open spaces and parks, and the commission may accept bonds in amounts sufficient to secure the actual construction and installation of any of the above required improvements, or provide for an assessment to secure such installations. (Ritchie-Florida)
W74-03723

BRIDGE CONSTRUCTION AND MAINTENANCE OVER OR ADJACENT TO STREAMS.
Conn. Gen. Stat. Ann., sec 13a-94 (Supp. 1972).

Descriptors: *Connecticut, *Bridge construction, *Road construction, *Flood control, *Environmental protection, Civil engineering, Flood damage, Flood protection, Engineering structures, Bridge design, Public rights, Public health, Public safety, Water law, Legislation, Public benefits.

These provisions express the necessity for protection of streams from problems which may be caused by adjacent highway projects. The requirements for the highway projects are set by the commissioner of environmental protection. Specifically, requirements are established for future highways adjacent to any stream subject to flood control measures. Any bridge in existence on a specified date must be rebuilt or modified in order to meet the requirements of the flood control plan. Provision is made for funds from which the costs of modifying structures may be paid. (Proctor-Florida)
W74-03724

WASTEWATER LAND TREATMENT SITE REGULATION ACT.
Ill. Pub. Acts (1973), ch. 78-350, sec. 1 through 10, to be codified as, Ill. Stat., ch. 111 1/2, sec. 581 to 590.

Descriptors: *Illinois, *Waste water disposal, *Waste water treatment, *Treatment facilities, *Sludge treatment, Sewage lagoon, Aerobic treatment, Wastewater, Permits, Environmental control, Legislation, Regulation, Administration, Sewage treatment, Administrative agencies.

The act authorizes the establishment and operation of wastewater land treatment sites or digested sludge utilization sites. No person can establish, operate, manage or maintain any wastewater land treatment site or any digested sludge utilization site without first obtaining a permit from the Illinois Environmental Protection Agency. Before a permit is issued a steering committee is to be formed to advise, recommend and issue a report relative to the site. Any person violating this act is subject to a $10,000 maximum fine for each offense. Provisions are established for proper hearings as well as for judicial review of all decisions. (Daniels-Florida)
W74-03725

RECREATIONAL USE OF LAND AND WATER AREAS--LIABILITY OF OWNERS.
Ill. Pub. Acts (1973), ch. 78-489, sec. 1, to be codified as, Ill. Stat., ch. 70, sec. 32.

Descriptors: *Illinois, *Legislation, *Statute, *Recreation, *Public access, *Water utilization, Legal aspects, Human Population, Adjacent landowners, Administration, Lakes, Competing uses.
Identifiers: *Liability.

The Act limits the liability of landowners who make their land and water areas available to the public for recreational purposes. The amended section 2 more definitely defines terms used in the Act including land, owner, recreational purpose, charge, and person, and it became effective October 1, 1973. (Sutton-Florida)
W74-03726

INTERTIDAL SALT MARSHES--PENALTY.

R. I. Gen. Laws Ann., sec. 11-46.1-1 (Supp. 1972).

Descriptors: *Salt marshes, *Fish management, *Environmental effects, *Legislation, Rhode Island, State jurisdiction, Water law, Fish populations, Penalties, Law enforcement, Regulation, Water resources development, Administrative agencies, Tidal marshes.

A permit program is set up to be administered by the Rhode Island department of natural resources for activity on intertidal salt marshes. Penalties are established for persons who deposit mud, dirt, or rubbish upon, or who excavate and disturb the ecology of intertidal salt marshes without first obtaining a permit. The statute further provides that any offenders may be ordered to restore such salt marsh to the extent practical. The director of natural resources shall refuse to issue a permit if in his judgment the ecology of the salt marshes will be disturbed by any activities delineated above. (Proctor-Florida)
W74-03727

DEPARTMENT OF NATURAL RESOURCES--DIVISIONS.
R. I. Gen. Laws Ann., sec. 42-17. 1-4 (Supp. 1972).

Descriptors: *Rhode Island, *Water resources, *Wetlands, *Marshes, *Coastal engineering, Aquatic habitats, Administration, Fisheries, Education (Social aspects), Environmental control, Fish management, Flood control, Dams (Engineering structures), Reservoirs, Project planning, Legislation, Administrative agencies, Natural resources.
Identifiers: Public education (Information dissemination).

Provisions establishing divisions within the Rhode Island department of natural resources are set forth. The division of fish and wildlife will function to protect fishing, wetlands and marsh areas. The division of coastal resources shall regulate flood control, harbor and shorelines, and shore development. The division of planning and development is established to disseminate information relating to natural resources and to inspect dams and reservoirs. The section also provides for an enforcement division. (Proctor-Florida)
W74-03728

ELIMINATION OF MOSQUITO-BREEDING PLACES.

Conn. Gen. Stat. Ann., sec. 19-50 (Supp. 1972).

Descriptors: *Connecticut, *Mosquitoes, *Public health, *Insect control, *Breeding, Legislation, Excavation, Construction, Physical control.

The Connecticut commissioner of health is charged with the dity of issuing regulations concerning the elimination of mosquitoes and mosquito-breeding places, and his agents have authority to enter upon land to make any excavations or structures necessary to effect such elimination. The commissioner shall assess the damage to each particular piece of land caused by elimination of breeding areas and notify, by publication and directly, the record land owners of the proposed work and his assessment of the damage to be caused. The land owner may then appeal the order and assessment to the court of common pleas. (Ritchie-Florida)
W74-03730

ESTABLISHMENT OF AIRPORTS ON PUBLIC WATERS AND RECLAIMED LANDS.
Tenn. Code Ann., sec. 42-305 (1957).

Descriptors: *Tennessee, *Legislation, *Airports, *Water law, *Land reclamation, Land use, Structures, Landfills, Land development, Surface drainage, Cities, Public lands, Water policy, Water utilization, Water structure.

Municipalities are authorized to acquire, establish and maintain, within the municipality's boundaries, airports in, over and upon any public waters, or any submerged lands under public waters. This includes artificial or reclaimed lands which before the artificial making or reclamation constituted a portion of the submerged lands under such public waters. The municipality may construct and maintain buildings, causeways, roadways and bridges connecting with any such airport, and landing floats and breakwaters for the protection thereof. (Silber-Florida)
W74-03731

STATE SHELL-FISHERIES.
Conn. Gen. Stat. Ann., sec. 26-195 (Supp. 1972).

Descriptors: *Connecticut, *Shellfish, *Aquatic life, *Aquiculture, *Boundary disputes, Legislation, Fisheries, Legal aspects, Water law.

The Connecticut commissioner of agriculture, on the petition of any interested person, is empowered to resolve all questions and disputes regarding the ownership, title, extent or location of any shell-fish grounds. The commissioner shall summon all parties in interest, who shall file sworn statements and counterstatements, upon which the commissioner shall make his determination. The commissioner's decision will be binding on all parties summoned to the hearing unless appealed to the court of common pleas within ten days. No appeal will be allowed until the party appealing has become bound to the adverse party, with sufficient surety, conditioned to prosecute such appeal to effect. (Ritchie-Florida)
W74-03732

WATER POLLUTION CONTROL.
Conn. Gen. Stat. Ann., sec. 25-54b to 25-54d, 25-54g to 25-541, 25-54o to 25-54s, 25-54hh, 25-54mm, 25-54oo, 25-54pp, 25-54qq (Supp. 1972), as amended, act 73-555, sec.4-8, act 73-38, sec. 1-7, act 73-665, sec. 8-16, act 73-192, sec. 1, 73-265, sec. 1 (1973), Pub. Acts of Conn.

Descriptors: *Connecticut, *Water pollution, *Sewage, *Sewage disposal, *Water pollution control, Legislation, Discharge (Water), Permits, Pollution abatement, Public health, Phosphorus, Detergents, Municipal wastes, Treatment facilities.

Section 25 of the Connecticut statutes reassigns water pollution control from the water pollution control administration to the state's environmental protection agency. The powers and duties of the commissioner of the environmental protection agency include general administration of the water pollution laws, development of plans for prevention and abatement of pollution, consultation with other agencies, and submission of plans, reports and accounts to federal agencies. He may provide grants to municipalities to finance facilities essential for the separation of storm and sanitary sewage, as well as establish categories of discharges for which he, or someone to whom authority is delegated, may issue permits. Following enactment, no person or municipality may initiate any new discharges into the waters without a permit from the commissioner. If the permit is denied, the commissioner shall require the applicant to submit plans for a pollution control system which is adequate to protect the waters. The statute also requires labeling of phosphorus content on detergents, and firms offering detergents for sale must file a statement with the commissioner listing the active ingredients. Provisions are included for appealing the commissioner's rulings as well as penalties, including injunctive relief for violating the act. (Ritchie-Florida)
W74-03733

MUNICIPALITIES--LAKE AUTHORITIES.
Conn. Gen. Stat. Ann., sec. 7-151a (Supp. 1972), as amended, act 73-241, sec. 1,2 (1973), Pub. Acts of Conn.

Descriptors: *Connecticut, *Administration, *Legislation, *Law enforcement, *Cities, Pollution abatement, Cost allocation, Water quality control, Project planning, Permits, Water management (Applied), Legal aspects, Water quality standards, Water pollution control, Lakes.

The Act concerns the powers of lake authorities, granted by township legislative bodies, and the acceptance of gifts by such authorities. The lake authority will be composed of three delegates from each member town and each member town shall pay to the authority its respective share of the expenses, prorated on the basis of its linear footage of shore line. The Act then provides for withdrawal procedure by member towns from the commission. Subsection two grants additional powers to the authority, including control and abatement of algae and aquatic weeds, to act as agents for member towns with respect to filing applications for grants and reimbursements and receiving gifts and also the power to carry out water management studies. (Sutton-Florida)
W74-03734

DAM CONTROL ACT.
W. Va. Code Ann., sec. 20-5D-1 through 20-5D-14 (1973).

Descriptors: *West Virginia, *Dam design, *Dam construction, *Dam failure, *Engineering structures, Impoundments, Flow control, Water control, Penalties (Legal), Legal aspects, Law enforcement, Regulation, Public helath, Public safety, Water law, Public rights, Public benefits, Administrative agencies, Legislation.
Identifiers: *Dam control.

In establishing controls for the construction, operation, and maintenance of dams in the state, the legislature recognizes the necessity for regulation and supervision to protect the health, safety, and welfare of persons and of property. Provisions establish the duties and powers of the director of natural resources with respect to dam control. His authority extends to the issuance of certificates of approval prior to any construction, alteration, or repair of a dam. Approval or disapproval of an application for the issuance of a permit is based on the sufficiency of such application. Certificates already issued may be revoked or suspended. A provision delineates the necessity of inspections during the construction or repair of dams to insure compliance with approved plans and specifications. Remedial actions on the part of the director to alleviate possible emergencies, and procedures for handling actual emergencies are established. Certificates of approval must be obtained both for dams already constructed as well as dams under construction prior to the effective date of the article. Penalties are imposed for violations of the provisions of the article. (Proctor-Florida)
W74-03735

OHIO RIVER VALLEY WATER SANITATION COMMISSION.

W. Va. Code Ann., sec. 29-1D-1 thru 29-1D-6 (1972).

Descriptors: *River basin commissions, *Interstate compacts, *Interstate commissions, *Water pollution control, *West Virginia, Abatement, Water pollution treatment, Water quality control, Contamination (Water), Pollution (Water), Industrial wastes, Municipal wastes, Recreation, Legislation.

This West Virginia statute enacts into law an interstate sanitation compact between the states of Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Tennessee and West Virginia. The purpose of the compact is to control future pollution and abate existing pollution in the Ohio River Valley drainage basin. The compact provides for treatment of sewage and industrial wastes with the primary goals to protect public health as well as preserve the waters for other legitimate purposes such as municipal and industrial water supplies and recreation. A commission shall conduct a survey of the territory included, study the pollution problems of the district, and make a comprehensive report using advice from national or regional planning bodies or consultants. The commission may order municipalities, corporations, persons, or other entities to abate or modify discharges. The commission or, at its request, the attorney general or other law-enforcing official, shall have power to bring suit to enforce such order. The statute also set out the methods of appointment, powers and duties of the commission for the state of West Virginia. (Worsham-Florida)
W74-03736

TUNING DOWN THE GNP,
Reilly, Like and Schneider, Babylon, N.Y.
For primary bibliographic entry see Field 06G.
W74-03744

CHANGING ATTITUDES IN WATER RESOURCES DEVELOPMENT IN THE PROVINCE OF MANITOBA,
Department of Mines and Natural Resources, Winnipeg (Manitoba).
For primary bibliographic entry see Field 06B.
W74-03747

6F. Nonstructural Alternatives

LEGAL FACTORS IN ECONOMETRIC MODELING OF LOCAL FLOODPLAIN MANAGEMENT DEVICES IN THE CONNECTICUT RIVER BASIN,
Massachusetts Univ., Amherst. Water Resources Research Center.
D. Wilkes.
Available from National Technical Information Service as PB-226 765; $4.75 in paper copy, $1.45 in microfiche. Completion Report, Publication No 34, September 1973. 48 p, 1 fig, 2 tab.

Descriptors: *Cost-Benefit analysis, *Econometrics, Flood plains, *Legal aspects, Model studies, Data collections, *Building codes, *Flood plain zoning, Computers, Water policy, *Connecticut River.

Content covers: administrative and legal contexts for use of econometric models in floodplain management strategies and problems of reducing vulnerability of models by measures to show accuracy of the process used to arrive at data inputs, persuasiveness of sources, and quality controls for calculator and computer runs.
W74-03207

CALIFORNIA COASTAL ZONE CONSERVATION ACT, INTERIM PERMIT CONTROL, GENERAL,
University of Southern California, Los Angeles.
L. Perry.
U.S.C. Sea Grant Program, School of Public Administration, USC-SG-ASI-73. 1 p, 1 chart.

Descriptors: *California, *Permits, *Legal aspects, *State governments, *Coastal plains, Legislation, Planning, Standards, State jurisdiction.
Identifiers: California Coastal Zone Conservation Act of 1972, Coastal waters.

Depicted is a chart showing the Interim Permit Control review process of the California Coastal Zone Conservation Act of 1972 (ACT) in a simplified form. It is intended for managers, labor unions, lenders, environmentalists, and other interested parties and to illustrate the main features of the permit process. Certain contingencies are beyond the scope of the work. Accompanying text material is intended to explain the chart and the appropriate regulations in an understandable form but not to explain involved details of the Act and regulations. This work is a simplified interpretation at a particular point in time, and is to be used only as an aid or guide for understanding the general permit process, and should not be construed as advice on the actual law. Included are legal and procedural time factors, and information on the public hearing phase, application decision phase, appeal phase, permit approval phase, emergency permits and future changes. Any development taking place within the coastal zone permit area between November 1972 and February 1977 must be approved by a permit granted by one of six regional coastal zone commissions. (Sears-Florida)
W74-03379

A BILL TO ESTABLISH A NATIONAL FLOOD PLAIN POLICY.
For primary bibliographic entry see Field 06E.
W74-03394

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE (FINAL ENVIRONMENTAL IMPACT STATEMENT).

Available from NTIS, U.S. Dep't of Commerce as PB-213-521, for $5.00 paper copy. March 1972. 45 p, 3 fig, 3 map, 3 tab, 9 ref.

Descriptors: *Florida, *Coasts, *Coastal plains, *Flooding, *Flood control, Flood proofing, Flood forecasting, Flood data, Crest-stage gages, Flood frequency, Flood protection, Flood recurrence interval, Insurance, Building codes.
Identifiers: *Environmental impact statements.

This report deals with the flooding problems of the Eastern Coastal Areas of Palm Beach County, Florida, and offers methods by which the more serious effects of heavy flooding could be minimized or avoided. Sections of the report are concerned with the patterns of development in Palm Beach County, a review of past flooding situations in the eastern areas and the determining of flood criteria as established by the Corps of Engineers. Also included are proposed flood hazard ordinance criteria, a model flood hazard district, flood proofing criteria, subdivision criteria and methods of controlling coastal flooding. It is intended that the information presented in this report will provide guidelines for local governing bodies in their adoption of flood control measures. Furthermore, this report hopes to assist local governments in adopting required legislation regarding flood prevention by presenting the following data: background information regarding past flooding conditions countywide; base map showing the limits of the 100 year floodcrest; summarization of federal criteria for regulatory controls to be adopted for prevention of flood damage; and a model ordinance for the establishment of a flood hazard zone district that meets general federal criteria and is adaptable to existing zoning codes.
W74-03397

THE GREAT MIAMI RIVER CORRIDOR STUDY: A CONCEPT PLAN.
Kiley (Dan) and Partners, Charlotte, Vt.

May, 1972. 41 p, 13 fig, 67 ref.

Descriptors: Rivers, *Recreation, *Parks, *Planning, Water sports, Flood plains, Aesthetics, Landscaping, *Land use, Access routes, *Ohio.
Identifiers: Open space, *Great Miami River (Ohio), Dayton, Ohio, Mad River (Ohio), Flood plain management, River Corridor, Stillwater River (Ohio).

The Great Miami River has been very important in the location and economic growth of the Dayton metropolitan area. The River is now seen as a key element in developing the recreational and amenity aspects of the area. There is great potential for using the continuity of the River Corridor as a unified system of parks, open areas, and scenic transportation routes. The 60 miles of levees and walls along the River, the numerous dams and reservoirs, and the floodplains which have been restricted from urban development can all be used for recreational, environmental, and amenity purposes in addition to their primary purpose of flood control. The River Corridor's development plan is based on several planning principles and concepts including the use of land use planning and zoning, the maintenance of continuity, emphasis on the visual impact of the River, public access systems and various paths and trails within the Corridor, planned unit residential development, and improved water-based recreation. The plan includes 92 specific projects or opportunities within the Corridor and gives special emphasis to paths and trails, water sports, landscaping, slope protection, and the use of old gravel pits for lagoons and hills. (Elfers - North Carolina)
W74-03631

METROPOLITAN DEVELOPMENT GUIDE: PROTECTION OPEN SPACE--POLICY PLAN, PROGRAM.
Metropolitan Council of the Twin Cities Area, Minn.
For primary bibliographic entry see Field 06G.
W74-03635

WATER SUPPLY AND DISTRIBUTION.
Somerset County Planning Board, Somerville, N.J.
For primary bibliographic entry see Field 06D.
W74-03647

6G. Ecologic Impact of Water Development

ENVIRONMENTAL ASPECTS OF WATERSHED PLANNING,
Soil Conservation Service, Jackson, Miss.
E. G. Sullivan.
In: Proceedings of 8th Mississippi Water Resources Conference, April 10-11, 1973, p 31-37, 1973.

Descriptors: *Environmental control, *Federal project policy, *Mississippi, *Projects, Watershed management, Planning, Third party effects, Reviews, Ecology, Ecosystems, Water quality control, Water pollution control, Evaluation.

A review of the impact of the National Environmental Policy Act of 1969 on watershed projects in Mississippi is presented. Mississippi had 45 watersheds which came under the policy for restudy. These were both Public Law-566 and flood prevention projects. Criteria for this study were (a) effect of project on the environment, (b) conformance to enumerated guidelines, and (c) economic justification. A team of biologists from the U.S. Fish and Wildlife Service, Mississippi Game and Fish Commission, and Soil Conservation Service (SCS) met and worked out systems for the environmental studies and agreed on methods. Most of the field work was done by SCS biologists in consultation with the other agency personnel. Each project was placed in one of three groups under the above criteria. If a project was placed in group one under all three criteria, there were no significant problems. Few projects fell in this category. Group two projects were flagged for restudy on certain environmental problems which were evident. Group three projects required a total restudy and reevaluation from all aspects. At the time of completion of this study there were 45 projects in Mississippi which were evaluated under these criteria. Of these, 15 were in group one, 19 were in group two, and 12 were in group three. This study was completed in June of 1971. (See also W74-03212) (Woodard-USGS)
W74-03215

WATER LAW AND ITS RELATIONSHIP TO ENVIRONMENTAL QUALITY: A BIBLIOGRAPHY OF SOURCE MATERIAL,
Colorado State Univ., Ft. Collins. Dept. of Economics.
For primary bibliographic entry see Field 05G.
W74-03322

ENVIRONMENTAL LAW - WATER POLLUTION REMEDIES - USE OF PUBLIC NUISANCE THEORY IN SUIT BY FEDERAL GOVERNMENT - UNITED STATES V. IRA S. BUSHEY AND SONS, INC.,
For primary bibliographic entry see Field 05G.
W74-03381

THE SUBSTANTIVE RIGHT TO ENVIRONMENTAL QUALITY UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT,
For primary bibliographic entry see Field 06E.
W74-03384

FLOOD PLAIN STUDY AND MODEL FLOOD PLAIN ORDINANCE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 06F.
W74-03397

BANKLICK CREEK WATERSHED (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W74-03398

FINISH ALLATOONA'S INTERSTATE RIGHT, INC. V. VOLPE (SUIT TO ENJOIN CONSTRUCTION OF LAST SEGMENT OF HIGHWAY 1-75 ACROSS PORTION OF PUBLICLY OWNED LAKE).
For primary bibliographic entry see Field 06E.
W74-03405

PEOPLE OF SAIPAN V. UNITED STATES DEPT. OF INTERIOR (ACTION TO ENJOIN CONSTRUCTION OF HOTEL ON PUBLIC LAND UNTIL ENVIRONMENTAL IMPACT OF HOTEL HAS BEEN EVALUATED).
For primary bibliographic entry see Field 06E.
W74-03406

CENTRAL BUCKS JOINT SCHOOL BUILDING AUTHORITY V. RAWLS (ACTION BY LANDOWNER TO RECOVER COMPENSATION FOR ALLEGED DE FACTO TAKING OF PROPERTY).

303 A 2d 863-867 (Pa Cmwlth 1973). 5 p.

Descriptors: *Pennsylvania, *Sewage effluents, *Sewage disposal, *Waste water (Pollution), *Property values, Real property, Legal aspects, Judicial decisions, Facilities, Eminent domain.
Identifiers: Nuisance (Legal aspects).

The plaintiff was a landowner who brought suit against the school building authority to recover for de facto taking of property. Plaintiff alleged that the emptying of the outfall sewer line from a school near her property created the following conditions: a quanity of effluent greater than any surface water which might otherwise have flowed onto her land; unpleasant odors; erosion of the stream bank and bed; unsightly growth of weeds on the stream bank; a danger of raw sewage being discharged into the stream; and the existence of a conspicuous sewer pipe, the operation and presence of which depreciated the value of her property. The court stated that although the concept of a de facto taking was relatively new, it is now established that there may well be a compensable injury to the enjoyment of one's property although the power of eminent domain has not been formerly exercised against the property. Thus, the effects of the sewer pipe's installation had deprived the plaintiff of real and material rights in the enjoyment of the property and for this injury, compensation was proper. (McKnight-Florida)
W74-03409

COMING TO TERMS WITH GROWTH AND THE ENVIRONMENT,
Minnesota Univ., Minneapolis. Dept. of Economics.
For primary bibliographic entry see Field 06B.
W74-03465

ANALYZING THE ENVIRONMENTAL IMPACTS OF WATER PROJECTS.
Stanford Univ., Calif. Dept. of Civil Engineering.

Available from the National Technical Information Service as AD-766 286 $8.75 in paper copy, $1.45 in microfiche. Army Engineer Institute for Water Resources, Alexandria, Virginia, IWR Report 73-3, March 1973. 432 p, 16 fig, 12 tab, 208 ref. DACW 31-71-C-0127.

Descriptors: *Analytical techniques, *Methodology, *Environmental effects, *Water resources development, Legal aspects, Flood control, Water quality, Physical properties, Reservoirs, Social values, Recreation, Dredging, Biological properties, Chemical properties, Waste disposal.
Identifiers: *Environmental impact statements, Carmel River Basin (Calif.), Stream channelization.

A systematic methodology for the identification, description, measurement and display of the environmental impacts associated with water resources development activities was developed and tested by seminar students at Stanford University. A framework defining and relating the major factors and terms relevant to environmental impact assessment, together with a general analytical approach is suggested, and a number of state-of-the-art reviews on the significant physical, biological and chemical impacts of impoundments, stream channelization, and dredging and spoil disposal, and flood control and recreation are presented. Also covered are requirements, problems and issues relevant to the analysis of ecological, visual, cultural and induced impacts, as well as staffing needs and other considerations. A case study performed by workshop participants involving several alternative reservoir projects on the Caramel River Basin in California is included. (Slattery-Wisconsin)
W74-03472

THE RESOLUTION OF UNCERTAINTY,
George Washington Univ., Washington, D.C. National Law Center.
For primary bibliographic entry see Field 05G.
W74-03479

ECONOMIC GROWTH AND ENVIRONMENTAL DECAY: THE SOLUTION BECOMES THE PROBLEM,
Washington State Univ., Pullman. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W74-03492

POLLUTION: ECONOMY AND ENVIRONMENT,
Kent Univ., Canterbury (England). Dept. of Economics.
For primary bibliographic entry see Field 06B.
W74-03493

CONSTRUCTING NONLINEAR DYNAMIC MODELS FOR SOCIO-ENVIRONMENTAL DECISIONMAKING: A METHODOLOGY,
California Univ., Davis. Inst. of Governmental Affairs.
For primary bibliographic entry see Field 06A.
W74-03501

NATURAL FEATURES ELEMENT OF THE COMPREHENSIVE PLAN: A PLAN FOR ACTION.
DeKalb County Planning Dept., Decatur, Ga.
For primary bibliographic entry see Field 04C.
W74-03633

CONSERVATION-OPEN SPACE PLAN; AMENDMENTS TO THE SPRINGFIELD COMPREHENSIVE PLAN.
Springfield Planning Dept., Mass.
For primary bibliographic entry see Field 03D.
W74-03634

METROPOLITAN DEVELOPMENT GUIDE: PROTECTION OPEN SPACE--POLICY PLAN, PROGRAM.
Metropolitan Council of the Twin Cities Area, Minn.

April, 1973. 21 p.

Descriptors: Natural resources, *Conservation, *Wetlands, *Minnesota, *Water courses, Planning, Urbanization, Recreation, Hydrologic aspects, Environmental effects, Floodplains, Soils, Coordination, *Comprehensive planning.
Identifiers: *Open space, Land use controls, Twin Cities (Minn.), Minneapolis (Minn.), St. Paul (Minn.).

This comprehensive policy plan for protecting open space is one element of the Metropolitan Development Guide and focuses on 'protection of open space' as contrasted with recreation open space. Natural resource categories to be protected include water bodies and water courses, wetlands, groundwater recharge areas, floodplains, erodible slopes, forests and woodlands, soils with severe limitations for development, production lands, and areas containing unique or endangered plants and animals. Policies relating to water resources include: Proper management of water bodies through enforcement of Minnesota pollution control standards will provide a supply of clean water to domestic and industrial uses. Natural watercourses should be included in local comprehensive plans and should be preserved and managed to handle storm runoff. Wetlands should be protected against alterations which would disrupt the local hydrologic and ecological systems. Major groundwater recharge areas should be mapped and included and included in future comprehensive plans. Development within recharge areas must not have a detrimental effect on groundwater quality or quantity. Counties and municipalities should designate a 100-year floodplain for all watercourses based on anticipated development in their watershed. Implementation of these policies is discussed and includes the coordination of state, metropolitan, local, and private interests and agencies, and the use of land use controls and tax incentives. (Elfers - North Carolina)
W74-03635

TROPICAL BAY IN DANGER,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
L. N. Scotten.
Sea Frontiers, Vol 18, No 2, p 66-74, March-April 1972, 1 map, 8 photo.

Descriptors: *Florida, *Mangrove swamps, *Erosion, *Spawning, *Ecosystems, *Inland waterways, Nutrients, Water quality, Food chains, Fish, Marine bacteria, Marine plants, Marine animals, Fisheries, Estuaries.
Identifiers: *Fill permits.

Much pressure is being applied by land developers for the removal of mangroves from southern Biscayne Bay and Card Sound in south Florida. However recent scientific studies have elucidated the role of mangrove ecosystems, and found them to be important for numerous purposes. In addition to their function as nurseries for young fishes, such areas are sites of abundant spawning. Mangroves also protect coastal areas from storms, permit land build-up of the areas, and tend to prevent erosion. They filter surface water runoff, thereby preventing large nutrient losses to the sea. They also cause a decrease in the velocity of inshore water which reduces suspended particulate matter and promotes water quality. Perhaps their greatest contribution lies in the role which they play in the food chain of many south Florida fisheries. Mangrove leaves die and fall into the water, where they are decomposed by bacteria and fungi. Eventually, they become fine matter of high nutritive value called organic detritus. Detritus feeds microscopic marine organisms, which are in turn fed on by larger organisms such as pink shrimp, clams and numerous fishes. Despite the importance of mangroves, the ecological balance of the area is beginning to show signs of environmental stress. (Ritchie-Florida)
W74-03716

THE RIVER OF GRASS IS DRYING UP,
G. Reiger.
National Wildlife, Vol 12, p 54-62, December-January 1974. 1 map, 2 illus, 9 photo.

Descriptors: *Florida, Land reclamation, *Much soils, *Irrigation canals, *Wetlands, *Land development, Marshes, Peat, Mangrove swamps, Lakes, Surface waters, Shallow water, Canals, Saline water intrusion, Surface drainage, Flooding, Standing waters, Grasses, Groundwater, Percolating water, Running waters, Water sources, Zone of saturation.
Identifiers: *Everglades.

Since 1880 the efforts of man to control the flow of water in southern Florida have reduced the Everglades to half of its original size. For thousands of years the vast interior muck lands functioned like a giant sponge, holding water during the wet seasons and gradually releasing it during dry times. In an attempt to make the wet region fit for human habitation and farming, sprawling networks of canals have been constructed. Through the years these canals have also precipitated a series of natural disasters ranging from persistent fires to sudden floods. Today they continue to upset the delicate balance of nature that prevails--momentarily at least--throughout the area. Slowly the

Everglades is drying up, and if it does, an enormous and intricate system of life will perish. As south Florida confronts continued growth and development, it also faces accelerated impoverishment of all of its natural resources. (Comfort-Florida)
W74-03718

THE IMPERILED EVERGLADES,
F. Ward.
National Geographic, Vol 141, p 1-27, January 1972. 2 chart, 13 photo.

Descriptors: *Florida, *Flood control, *Drainage systems, *Surface drainage, *Wildlife management, Flood routing, Dikes, Flow control, Aquifers, Aquifer management, Water sources, Saline water intrusion, Abatement, Watershed management, Burning.
Identifiers: *Everglades.

The series of rampaging fires which destroyed large parts of the Everglades in 1971 were the result of a larger crisis which threatens the Everglades and the entire population of South Florida. The crisis is water--how it is managed and for what purpose. The Everglades suffered through a severe drought in 1970 and 1971. The activities of man in draining and developing the area magnified the adverse effects of the drought. The entire Everglades area was once covered by water. The flow of water over the Everglades is essential to the prevention of salt water intrusion into the aquifer from which the Miami area draws its drinking water. However, water levels have been upset both above and below the surface. Development in the Big Cypress swamp from which the Everglades receives 56% of its surface waters is partially to blame. But the major problem stems from the drainage of all the land south and east of Lake Okeechobee except for the Everglades Park and certain water conservation areas, for the purpose of flood control. Proposed solutions are reflooding the entire area as well as raising the level of Lake Okeechobee. (Flowers-Florida)
W74-03720

DISPOSAL OF OLD VESSELS AND FLOATING STRUCTURES.

Conn. Gen. Stat. Ann., sec. 15-31 (Supp. 1972).

Descriptors: *Harbors, *Navigation, *Rivers, *Permit, *Navigable rivers, *Connecticut, Administrative agencies, Legislation, Flotsam, Penalties (Legal), Transportation.
Identifiers: Navigation obstructions.

Anyone who allows his vessel, scow, lighter, or similar floating structure to be broken, run aground, or altered to such an extent that it will not float with ordinary care within the confines of any river or harbor shall be subject to a fine and/or imprisonment. However, such owner shall not be subject to such penalties if he first obtains a permit from the commission of transportation. (Comfort-Florida)
W74-03729

TUNING DOWN THE GNP,
Reilly, Like and Schneider, Babylon, N.Y.
I. Like.
Environment, Vol 15, No 6, p 6-15, 1973. 52 ref.

Descriptors: *Gross national product, *Decision making, Federal government, *Environmental effects, Political aspects, Cost-benefit analysis, *Government finance.
Identifiers: *Environmental impact statements, Federal Reserve Board.

Under the National Environmental Policy Act, environmental impact statements are required of all federal agencies whose duties significantly affect the quality of the human environment. For the most part, the requirement has been applied only to agencies controlling or financing particular projects. Federal fiscal and monetary policies, which often have a cause-effect relationship with these projects are not under the scrutiny of this Act. The Federal Reserve Board was chosen to illustrate the effects of alternative monetary policies on project benefits and environmental costs and to suggest how the NEPA might be applied to all federal agencies exercising economic power. The Board's policy to encourage growth is examined in the light of recent articles on pollution. The environmental effects of: (1) credit and monetary policy designed to stimulate a steady state or recycling economy; (2) preferencial treatment to industries installing pollution abatement equipment; and (3) environmental protection standards governing all loans subject to the FRB regulatory power, are evaluated. (Schroeder-Wisconsin)
W74-03744

07. RESOURCES DATA

7A. Network Design

DESIGN OF OPTIMAL PRECIPITATION NETWORKS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 02B.
W74-03333

7B. Data Acquisition

ROLE OF BOREHOLE GEOPHYSICS IN UNDERGROUND WASTE STORAGE AND ARTIFICIAL RECHARGE,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 05E.
W74-03229

A CULTURE SYSTEM FOR ARTEMIA, DAPHNIA, AND OTHER INVERTEBRATES, WITH CONTINUOUS SEPARATION OF THE LARVAE,
Ghent Rijksuniversiteit (Belgium).
For primary bibliographic entry see Field 05A.
W74-03283

A NEW METHOD FOR THE ESTIMATION OF ABSOLUTE MICROFOSSIL NUMBERS, WITH REFERENCE ESPECIALLY TO DIATOMS,
Uppsala Univ. (Sweden). Dept. of Quaternary Geology.
For primary bibliographic entry see Field 05A.
W74-03285

EAGLE EYE - NEW FLOWMETER,
Dieterich Standard Corp., Boulder, Colo. Ellison Instrument Div.
K. O. Plache.
Measurements and Data, Vol 7, No 5, p 104-106, September/October 1973. 3 fig, 1 tab, 4 ref.

Descriptors: *Design, *Flowmeters, Laboratory equipment, Instrumentation, Flow measurement.

The Eagle Eye flowmeter uses an 'Annubar' primary flow element as the flow sensor and a new indicator designed specifically for use with the sensor. Basically, the sensor transmits a pressure signal to a diaphragm which converts axial motion to the pivotal motion of a range spring. The motion of the range spring is transmitted to the meter pointer by means of a permanent (stator) magnet on the range spring and a follower magnet on the pointer. Several advantages of the system are: readout is direct and close to linear; the sensor is available in sizes of 1/2 inch to 180 inches and does not require complicated engineering; pressure loss is low; accuracy and dependability are high; measurements can be made with dirty liquids; readings can be remote from the measurement site; and cost is competitive with those of other flowmeters. (Little-Battelle)
W74-03290

AN INEXPENSIVE, FAST RESPONSE CURRENT SPEED INDICATOR,
Virginia Inst. of Marine Science, Gloucester Point.
R. J. Byrne, and J. D. Boon, III.
Chesapeake Science, Vol. 14, No 3, p 217-219, September 1973. 4 fig, 1 tab, 2 ref.

Descriptors: *Design, *Costs, *Calibrations, *Current meters, Mechanical equipment, Electronic equipment, On-site tests, Rotating meters.
Identifiers: *Detection limits.

A low cost, fast response current speed sensor consists of a bearing supported axial rotor inside a cylindrical duct. The rotation rate of the impeller is obtained by counting the number of closures of a magnetic proximity switch, mounted on the duct, which is actuated by the passage of small magnets bonded to the impeller. The signal is transmitted to a surface counter, a high-speed electromechanical counter and a solid state pulse generator, by the conductor suspension cable. The sensor output is linear over the calibration range of 0 to 150 cm/sec. Threshold speed is about 1.5 cm/sec. Field usage indicates the device will be useful for shallow water applications in hydraulics and ecology. Total cost to construct the unit is estimated to be about 200 dollars. (Little-Battelle)
W74-03310

A NEW MULTIPARAMETER SEPARATOR FOR MICROSCOPIC PARTICLES AND BIOLOGICAL CELLS,
Los Alamos Scientific Lab., N. Mex.
J. A. Steinkamp, M. J. Fulwyler, J. R. Coulter, R. D. Hiebert, and J. L. Horney.
Review of Scientific Instruments, Vol 44, No 9, p 1301-1310, September 1973. 11 fig, 44 ref.

Descriptors: *Instrumentation, *Separation techniques, *Cytological studies, Electronic equipment, Data processing.
Identifiers: *Sorting, *Staining, Counting, *Counting chambers, Biological samples.

A new flow-system instrument for quantitative analysis and sorting of microscopic particles, particularly biological cells, based on multiple measurements of physical and biochemical properties has been developed. Cells stained with fluorescent dyes in liquid suspension enter a unique flow chamber where electrical and optical sensors measure cell volume, single- or two-color fluorescence, and light scatter, and emerge in a liquid jet that is broken into uniform droplets. Sensor signals are electronically processed several ways for optimum cell discrimination and are displayed as pulse-amplitude distributions using a pulse-height analyzer. Processed signals trigger cell sorting according to preselected parametric criteria. Sorting is accomplished by electrically charging droplets containing the cells and electrostatically deflecting them into collection vessels. This instrument is described in detail with illustrative examples of experiments using polystyrene fluorescent microspheres, cultured human cells, and human leukocytes. (Little-Battelle)
W74-03313

PREPARATION OF SLIDE PERIPHYTON FOR VARIOUS PRODUCTIVITY ANALYSES,
Bemidji State Coll., Minn. Dept. of Biology.
D. B. Czarnecki, H. D. Williams, and E. I. Nordheim.
Transactions of the American Microscopical Society, Vol 92, No 2, p 284-285, April 1973. 2 ref.

Descriptors: *Periphyton, *Primary productivity, *Diatoms, *Systematics, *Methodology, *Measurement, Chrysophyta, Biological communities, Chlorophyll, Algae.
Identifiers: Slide preparation, Sample preparation, Frustules, Recovery.

An analytical procedure which employs ultrasonic vibration for the removal of diatoms from microscope slides has been used to obtain data on community chlorophyll content and diatom composition from the same sample. In this procedure the periphyton slide is placed in a polyethylene bag filled with MgCO3 saturated 90 percent acetone and the bag suspended in a vibrator filled with tap water and a small amount of wetting agent. The instrument is set at maximum cavitation for 30 min after which the bag is removed, its content poured into centrifuge tubes and centrifuged at top speed for 10 min. Acetone solutions of the contents were analyzed for chlorophyll content. Dilutions and centrifugations of the remaining tubes yield a suspension from which the diatom frustules may be cleaned and mounted. In applying the above technique, a recovery rate of over 99 percent was maintained using slide substrates incubated over a period of 8 weeks. (Holoman-Battelle)
W74-03315

A MULTISPECTRAL STUDY OF AN EXTRATROPICAL CYCLONE WITH NIMBUS 3 MEDIUM RESOLUTION INFRARED RADIOMETER DATA,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 02B.
W74-03349

AN INSTRUMENTATION SYSTEM TO MEASURE NEAR-BOTTOM CONDITIONS ON THE CONTINENTAL SHELF,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02J.
W74-03353

TIME-INTERVAL PHOTOGRAPHY OF LITTORAL PHENOMENA,
Army Coastal Engineering Research Center, Washington, D.C. Engineering Development Div.
For primary bibliographic entry see Field 02J.
W74-03364

REMOTE SENSING IN THE STUDY OF COASTAL PROCESSES,
Army Coastal Engineering Research Center, Washington, D.C.
O. T. Magoon, and D. M. Pirie.
Reprint No 17-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 115, p 2027-2042, 1972. 10 fig.

Descriptors: *Remote sensing, *Beaches, *Shores, Aerial photography, Infrared radiation, Sedimentation, Water pollution, Coastal engineering, Radar.

Remote sensing was studied for use in coastal studies. The devices used were multiband photography, the infrared scanner, the Side Looking Airborne Radar, and various image enhancement and processing devices. Color produced excellent presentation of land features and limited information from sea and subsurface features. Color IR showed the size and quality of marine kelp beds but provided no way of determining whether the kelp is on the surface. The yellow wratten 12 filter on overexposed color film gave the most useful information for the analysis of current and sediment patterns. Material from sewer outfalls is clearly seen on this imagery. It also provided good water penetration. With normal exposure, red produces primarily water surface information and is thus useful in enhancement combinations. If this combination is overexposed 1 'f' stop, considerable additional sedimentary information is obtained. Infrared (IR) energy can only penetrate a short distance into seawater and is highly reflected by vegetation including algae. Therefore, only the surface canopy of nearshore kelp is seen. Near-IR film is excellent for use in the analysis of waves breaking upon a beach. Since the IR film is not sensitive to a response by sediments and bottom colors, a good photograph can be obtained of coastal waves, beach cusps, and refraction patterns. (Knapp-USGS)
W74-03373

COASTAL APPLICATIONS OF THE ERTS-A SATELLITE,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02J.
W74-03374

LABORATORY INVESTIGATIONS OF WHITECAPS, SPRAY AND CAPILLARY WAVES,
Florida Univ., Gainesville. Coll. of Engineering.
For primary bibliographic entry see Field 02E.
W74-03506

BACKSCATTERING FROM A TWO-SCALE ROUGH SURFACE WITH APPLICATION TO RADAR SEA RETURN,
Kansas Univ./Center for Research, Inc., Lawrence.
H. L. Chan, and A. K. Fung.
Available from NTIS, Springfield, Va. 22151 NASA CR-2327 Price $3.50 printed copy ($6.00 foreign); $1.45 microfiche. National Aeronautics and Space Administration Contractor Report CR-2327, November 1973. 63 p, 17 fig, 1 tab, 17 ref, 7 append. NASA contract NAS 1-10048.

Descriptors: *Remote sensing, *Oceans, *Surface waters, *Surface tension, *Radar, Reflectance, Refractivity, Model studies, Equations, Waves (Water), Ocean waves, Analytical techniques, Winds.
Identifiers: Surface scatter theory, Backscattering.

A two-scale composite sea-surface scattering theory was developed without using the noncoherent assumption. The surface is assumed electrically homogeneous and finitely conducting; the surface roughness may be nonuniform geometrically. The special forms of the terms excluding the noncoherent assumption and the meanings of these terms are discussed. To gain insight into the mechanisms of backscattering, the results are compared with those obtained by previous theories. The comparison with NRL data shows satisfactory agreement for both horizontal and vertical polarization, especially for incident angles larger than 30 deg. For smaller incident angles, NASA/JSC data have been chosen for comparison, and close agreement is again observed. (Woodard-USGS)
W74-03509

A NON-COHERENT MODEL FOR MICROWAVE EMISSIONS AND BACKSCATTERING FROM THE SEA SURFACE,
Kansas Univ./Center for Research, Inc., Lawrence.
S. T. Wu, and A. K. Fung.
Available from NTIS, Springfield, Va. 22151 NASA CR-2326 Price $3.00 printed copy ($5.50 foreign); $1.45 microfiche. National Aeronautics and Space Administration Contractor Report CR-2326, November 1973. 30 p, 10 fig, 24 ref. NASA Contract NAS 1-10048.

Descriptors: *Remote sensing, *Surface waters *Oceans, *Surface tension, *Microwaves Reflectance, Refractivity, Ocean waves, Wind velocity, Water temperature, Forecasting, Model studies, Analytical techniques, Correlation analysis.
Identifiers: Backscattering, Two-scale sea surface.

The two-scale (small irregularities superimposed upon large undulations) scattering theory proposed by Semyonov has been extended and used to compute microwave apparent temperature and the backscattering cross section from ocean surfaces. The effect of the small irregularities upon the scattering characteristics of the large undulations is included by modifying the Fresnel reflection coefficients; whereas the effect of the large undulations upon those of the small irregularities is taken into account by averaging over the surface normals of the larte undulations. The same set of surface parameters is employed for a given wind speed to predict both the scattering and the emission characteristics at both polarizations. Improved agreement with measured results is demonstrated when compared with predictions by a single scale surface. This indicates that the sea surface is better modeled by a composite rather than a single surface. The results also imply that the adequacy of a scattering model is best exemplified when it is used to predict both the scattering and the emission characteristics. (See also W74-03508 and W74-03540) (Woodard-USGS)
W74-03510

THE METEOROLOGICAL EFFECTS ON MICROWAVE APPARENT TEMPERATURES LOOKING DOWNWARD OVER A SMOOTH SEA,
Kansas Univ./Center for Research, Inc., Lawrence.
S. Wu.
Available from NTIS, Springfield, Va. 22151 NASA CR-2325 Price $3.00 printed copy; $1.45 microfiche. (Foreign printed copy $5.50). National Aeronautics and Space Administration Contractor Report CR-2325, November 1973. 33 p, 13 fig, 26 ref, 1 append. NASA Contract NAS 1-10048.

Descriptors: *Water temperature, *Sea water, *Surface waters, *Model studies, Methodology, Aircraft, Meteorological data, Rain, Clouds, Instrumentation, Absorption, Microwaves, Mathematical models.
Identifiers: Smooth Sea.

The effects of clouds and rain on microwave apparent temperatures for a flat sea surface are examined. The presence of clouds and rain can be expressed as a change of absorption coefficient and the total absorption is computed as the sum of individual effects. Various cloud and rain models proposed by meteorologists are employed to compute the microwave apparent temperature when viewing downward through these model atmospheres. Stratus, cumulus, overcast, and rain all contribute significantly to the observed temperature. Larger sensitivities to clouds and rain are observed for horizontally polarized apparent temperature at large nadir angles than for vertically polarized apparent temperatre. (See also W74-03509 and W74-03510) (Woodard-USGS)
W74-03511

A CONVENIENTLY CONSTRUCTED DIVISOR FOR SPLITTING LOW WATER FLOWS,
Cornell Univ., Ithaca, N.Y. Agricultural Experiment Station.
D. R. Coote, and P. J. Zwerman.
Soil Sci Soc Am Proc. Vol 36, No 6, p 970-971. 1972. Illus.
Identifiers: *Divisor, Drainage, *Flow rates, Measurement, Runoff, Splitting, *Water flow, Coshocton wheel.

An easily constructed divisor was designed to attach directly to a Coshocton wheel. It is shallow to enable it to fit under the wheel outlet. Reliability estimates are given for a range of flow rates. This instrument is used to obtain representative and conveniently small samples of agricultural runoff water.--Copyright 1973, Biological Abstracts, Inc.
W74-03522

RADIOISOTOPIC SAND TRACER STUDY POINT CONCEPTION, CALIFORNIA. PRELIMINARY REPORT ON ACCOMPLISHMENTS JULY 1966 - JUNE 1968,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02J.
W74-03608

SURFACE CHARACTERISTICS OF WINDROWS,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 02L.
W74-03618

CIRCUIT FOR WATER DEPTH METER,
Vexilar, Inc., Minneapolis, Minn. (assignee).
C. F. Bartel, Jr.
U.S. Patent No 3,764,962, 9 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 915, No 2, p 736, October 9, 1973.

Descriptors: *Patents, *Water levels, Measurement, *Instrumentation, Electrical equipment, Depth.
Identifiers: *Water depth meters.

A depth meter for use in water is described. It has a rotating disc carrying a light emitting diode that lights up to give depth indications. The rotating disc also carries a magnet which is used to generate a signal to initiate transmission of a high frequency signal through a crystal. The crystal receives any returned signal reflected from the bottom or an object in the water. The reflected signal is amplified, and a pulse discrimination circuit is used to determine if the amplified signal is acceptable. An acceptable signal trips a power circuit to a light emitting diode to indicate the depth of the bottom or object causing the reflected signal. (Sinha - OEIS)
W74-03666

CONVERSION SYSTEM FOR PROVIDING USEFUL ENERGY FROM WATER SURFACE MOTION,
For primary bibliographic entry see Field 08C.
W74-03669

A PRACTICAL METHOD OF CALCULATING POTENTIAL EVAPOTRANSPIRATION, (IN FRENCH),
For primary bibliographic entry see Field 02D.
W74-03721

7C. Evaluation, Processing and Publication

INTEGRATED SYSTEM IDENTIFICATION AND OPTIMIZATION FOR CONJUNCTIVE USE OF GROUND AND SURFACE WATER PHASE I,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 02F.
W74-03201

GULLY BANK EROSION: MECHANICS AND SIMULATION BY DIGITAL COMPUTER,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 02J.
W74-03202

ARTIFICIAL RECHARGE IN UNITED KINGDOM WITH SPECIAL REFERENCE TO LONDON BASIN,
Water Resources Board, Reading (England).
For primary bibliographic entry see Field 04B.
W74-03225

INVESTIGATION OF RUNOFF OF KAMCHATKA RIVERS BASED ON CLIMATIC DATA (ISSLEDOVANIYE STOKA REK KAMACHATKI PO KLIMATICHESKIM DANNYM),
Adademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 02E.
W74-03259

TWO-LEVEL SKIP-LOT SAMPLING PLANS - OPERATING CHARACTERISTIC PROPERTIES,
Procter and Gamble Co., Cincinnati, Ohio.
R. L. Perry.
Journal of Quality Technology, Vol 5, No 4, p 160-166, October 1973. 2 fig, 2 tab. 7 ref.

Descriptors: *Quality control, *Sampling, Statistical methods.
Identifiers: Skip lot sampling.

Skip-lot sampling plans are a system of lot-inspection plans which allow skipping inspection of a fraction of the samples when the quality history shows that the product is good. The operating characteristics of three two-level skip-lot sampling plans are described. Basically the procedures involve normal inspection until a certain number of lots are accepted at which time skip-lot sampling is effected. If a given number of additional lots are accepted, a second skip-lot sampling scheme is used. If an item is rejected, the sampling procedure reverts to the original inspection scheme. The three procedures tested were compared to show the shortcomings and benefits of each. The plans can reduce the amount of inspection required when quality is good and adjust the amount of reduction according to the level of submitted quality.
W74-03291

ONE-WAY ANALYSIS OF VARIANCE,
General Electric Co., Louisville, Ky.
D. M. Olsson.
Journal of Quality Technology, Vol 5, No 4, p 191-193, October 1973. 1 fig, 5 ref.

Descriptors: *Computer programs, *Data processing.
Identifiers: *Analysis of variance.

A computer program for one-way analysis of variance is described. The advantages of the program are: (1) flexible, easy-to-use input; (2) averages and standard deviations of averages within treatment variances and residuals can be calculated; (3) analysis of variance can be tabulated and the treatment component of variance can be estimated; and (4) the probability of exceeding the calculated treatment F-ratio can be provided. (Little-Battelle)
W74-03292

STATISTICAL PREDICTION OF EQUILIBRIUM TEMPERATURE FROM STANDARD METEOROLOGICAL DATA BASES,
ESL, Inc., Sunnyvale, Calif.
For primary bibliographic entry see Field 05A.
W74-03330

THE GENERATION OF FLOOD DAMAGE TIME SEQUENCES,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 04A.
W74-03334

NUMERICAL CALCULATION OF WAVE REFRACTION DIGITAL COMPUTER,
Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
For primary bibliographic entry see Field 08B.
W74-03343

LABORATORY FACILITY FOR STUDIES RELATED TO ARTIFICIAL RECHARGE,
Geological Survey, Lubbock, Tex.
For primary bibliographic entry see Field 04B.
W74-03360

DAMS AND RESERVOIRS IN TEXAS: PART II,
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 08A.
W74-03375

AN EVALUATION OF WATER-QUALITY DATA OBTAINED AT FOUR STREAMFLOW DAILY-RECORD STATIONS IN IDAHO,
Geological Survey, Boise, Idaho.
For primary bibliographic entry see Field 05A.
W74-03507

PROCEDURES FOR TESTING THE DIFFERENCE OF MEANS WITH INCOMPLETE DATA,
Florida State Univ., Tallahassee. Dept. of Statistics.
P. E. Lin.
Journal of the American Statistical Association, Vol 68, No 343, p 699-703, September 1973. 2 tab, 10 ref.

Descriptors: *Testing, *Statistical methods, Average, Sampling, Monte Carlo method, Quality control.
Identifiers: *Difference of means, Bivariate normal distribution, Missing data, Hypothesis testing.

Procedures for testing the difference of means are obtained in sampling from a bivariate normal distribution with covariance matrix sigma when some of the observations on one of the variables are missing. A UMP test procedure is obtained when sigma is known. When sigma is not known, exact test procedures may be obtained by discarding partial data. To make use of all available data, approximate test procedures are proposed. These procedures are compared to the exact tests, obtained by discarding partial data, using Monte Carlo methods. 9mortland-Battelle)
W74-03581

PROCESSING AND ANALYSIS OF RADIOISOTOPIC SAND TRACER (RIST) STUDY DATA,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 02J.
W74-03628

THE WATER CYCLE ON A WATERSHED IN THE PALOUSE REGION OF IDAHO,
Bureau of Reclamation, Fresno, Calif.
For primary bibliographic entry see Field 04A.
W74-03739

08. ENGINEERING WORKS

8A. Structures

MINIMUM COST DESIGN OF WATER DISTRIBUTION SYSTEMS,
Kentucky Water Resources Inst., Lexington.
D. J. Wood, and C. O. Charles.

Available from National Technical Information Service as PB-226 764; $3.50 in paper copy, $1.45 in microfiche. Research Report No 62, 1973. 46 p, 2 fig, 5 ref, 1 append.

Descriptors: *Water distribution (Applied), *Optimization, *Piping systems (Mechanical), *Network design, Economic efficiency, *Costs, Design, Pipelines, Pressure, Flow, Dynamic programming.

The objective was to develop the analytical tools and procedures for minimum cost design of water distribution systems. Both analog and digital means of carrying out pressure and flow calculations were developed. As a result of this effort, digital programs for pressure and flow calculations in water distribution systems were written and have been widely distributed to practicing engineers. One procedure is based on a direct solution of the basic system equations using a linearization scheme and has several advantages over conventional techniques such as the Hardy Cross method. These include avoiding the need to initially balance the network and an assured convergence of the procedure. Using this tool a procedure was developed for selecting pipe diameter which will result in a minimum cost design within the prescibed constraints. The method of steepest ascent and dynamic programming concepts were used to carry out the optimization. This procedure applies to closed loop systems without internal pumping. This work provides a basis for extending the concepts to more generalized water distribution systems. (Grieves - Kentucky)
W74-03205

STATE OF GROIN DESIGN AND EFFECTIVENESS,
Army Coastal Engineering Research Center, Washington, D.C. Evaluation Branch.
J. H. Balsillie, and D. W. Berg.
Reprint No 15-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 75, p 1367-1383, 1972. 1 fig, 47 ref.

Descriptors: *Groins (Structures), *Coastal engineering, Littoral drift, Sedimentation, Sediment control, Beach erosion, Beaches, Coastal engineering.

A review of functional design criteria includes groin length, height, spacing, permeability-adjustability, and orientation. Coastal processes and their relationship to groin design and effectiveness are also discussed. As a general rule, groins should not be built where there are inadequate supplies of longshore moving drift; where supplies are inadequate, artificial fill should be used either independently or in conjunction with groins. (Knapp-USGS)
W74-03370

DAMS AND RESERVOIRS IN TEXAS: PART II,
Texas Water Development Board, Austin.
C. L. Dowell, and R. G. Petty.
Texas Water Development Board Report 126, November 1973. 329 p.

Descriptors: *Dams, *Reservoirs, *Dam design, *Texas, Hydraulic structures, Hydraulic properties, Damsites, Dam construction, Dam foundations, Aerial photography.
Identifiers: *Trinity River basin (Tex), *San Jacinto River basin (Tex), *Brazos River basin (Tex).

Documentation is presented, where possible, concerning structural details, hydraulic characteristics, tables of general information, and photographs of all dams and reservoirs with 5,000 acre-feet or more capacity located in Texas. In order to have a convenient size, the report is printed in three parts. This part, Part II, includes projects completed or in progress as of October 31, 1972, in the Trinity, San Jacinto, and Brazos River basins and the adjoining coastal basins. The data sheets were prepared from the best available information, including Texas Water Development Board Report 48, the Texas Water Rights Commission files, the Texas Water Development Board files, the project owners, and the consulting engineers. The sheets were then presented to the project owners for approval before printing. (Woodard-USGS)
W74-03375

AMERICAN FALLS DAM, UPPER SNAKE RIVER PROJECT, IDAHO.
For primary bibliographic entry see Field 06E.
W74-03419

THE EFFECTS OF WATER CONSERVATION WORKS ON THE REGIME OF MORECAMBE BAY,
Hydraulics Research Station, Wallingford, (England).
For primary bibliographic entry see Field 04A.
W74-03483

8B. Hydraulics

MINIMUM COST DESIGN OF WATER DISTRIBUTION SYSTEMS,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 08A.
W74-03205

TIDAL INLETS FOR PRESERVATION OF ESTUARIES,
Lockwood, Andrews and Newnam, Inc., Houston, Tex.
For primary bibliographic entry see Field 02L.
W74-03342

NUMERICAL CALCULATION OF WAVE REFRACTION DIGITAL COMPUTER,
Texas A and M Univ., College Station. Coastal and Ocean Engineering Div.
T. E. Orr, and J. B. Herbich.
Available from NTIS as PB-190 657, for $6.00 paper copy, $1.45 microfiche. Sea Grant Publication No 209, COE Report No 114, December 1969. 79 p, 27 fig, 4 tab, 15 ref, 3 append. Grant GH-29.

Descriptors: *Coastal structures, *Waves (Water), *Shallow water, *Refraction (Water waves), Mathematical models, Digital computers, *Computer programs.
Identifiers: Shoaling, Bottom topography.

Recent developments in methods for analysis of offshore structures warrant refining the calculation of wave forces that will act on the structures. Wave height is one of the prime criteria required to obtain an accurate estimate of these forces; therefore, it is imperative that the engineer be able to predict the wave height as closely as possible. In shoaling waters refraction affects the wave height significantly and can either increase it or decrease it. LePetit of the Laboratoire National d'Hydraulique in France has proposed a method for calculating wave refraction using numerical methods. A computer program was developed based on LePetit's method and a number of refraction patterns were obtained for waves passing over a region of complex hydrography. These refraction patterns were compared to patterns obtained using graphical methods. The computer solutions were found to be faster to plot and more responsive to hydrographical changes close to the shoreline. (Sinha-OEIS)
W74-03343

MAXIMUM BREAKER HEIGHT FOR DESIGN,
Army Coastal Engineering Research Center, Washington, D.C.
J. R. Weggel.
Reprint No 8-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 21, p 419-432, 1972. 6 fig, 15 ref, append.

Descriptors: *Waves (Water), *Surf, *Coastal engineering, Equations, Coastal structures.
Identifiers: Waves (Breaking).

The re-evaluation of previously published breaking wave data was used to develop a relationship for the maximum breaker height in terms of the depth in which the wave breaks, breaker steepness, and the local beach slope. This relationship is used with breaker travel distance to estimate the maximum breaker height to which a coastal structure might be subjected. In addition, the range of depths in which a wave of given height will break may be found by examination of the upper bound of observed values of db/Hb. An example problem is presented to illustrate the use of the general maximum breaker height design curves. (Knapp-USGS)
W74-03363

CHARACTER AND STABILITY OF A NATURAL TIDAL INLET,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 02L.
W74-03365

CASE HISTORY OF MISSION BAY INLET, SAN DIEGO, CALIFORNIA,
Moffat and Nichols, Long Beach, Calif.
W. J. Herron, Jr.
Reprint No 11-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 43, p 801-821, 1972. 4 fig, 1 tab, 13 ref.

Descriptors: *Coastal engineering, *Inlets (Waterways), *Scour, *Sedimentation, Silting, Sediment transport, Littoral drift, Waves (Water), Currents (Water), Jetties, Coastal structures, *California.
Identifiers: Mission Bay (Calif).

The Mission Bay Inlet was designed as a nonscouring entrance channel by the Corps of Engineers in 1946. A channel with over twice the cross sectional area required by the O'Brien equation was developed to reduce the average cross sectional tidal currents to less than two feet per second. The design depth of -20 feet MLLW eliminated bottom movement induced by wave action, except during the most severe storms. The jetties are sealed to the +4 foot elevation and extend to the -25 foot depth almost entirely eliminating the intrusion of littoral drift. The channel has shoaled at a rate of less than 20,000 cubic yards per year since final dredging in 1959, indicating the soundness of this concept. (Knapp-USGS)
W74-03366

STATE OF GROIN DESIGN AND EFFECTIVENESS,
Army Coastal Engineering Research Center, Washington, D.C. Evaluation Branch.
For primary bibliographic entry see Field 08A.
W74-03370

WAVE RUNUP ON VERTICAL CYLINDERS,
Army Coastal Engineering Research Center, Washington, D.C. Coastal Processes Branch.
C. J. Galvin, and R. J. Hallermeier.
Reprint No 19-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14,

1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 111, p 1955-1974, 1972. 14 fig, 2 tab, 21 ref.

Descriptors: *Waves (Water), *Piers, Piles (Foundations), Coastal engineering.
Identifiers: *Wave runup.

Wave height at a point on vertical cylinders is a function of the orientation angle between the normal from the point and the direction of travel of a single periodic train of waves. The wave height distribution has a broad maximum around 0 deg (facing into the waves) and a more restricted maximum at 180 deg. The maximum at 0 deg increases with wave height in all cases, and the superelevation has about the magnitude of the velocity head in the wave crest. Most of the variation in height is due to variation in crest elevation; trough elevation remains relatively constant. The shape of the wave height distribution depends more on height and cylinder cross section than on period, although the variation as a function of cross section is significantly less than the extreme variations in tested cross sections. Applications of these results to wave direction measurement and to interpretation of wave records from surface-piercing wave gages are discussed. (Knapp-USGS)
W74-03372

TIDAL RESONANCE IN THE BAY OF FUNDY AND GULF OF MAINE,
Dalhousie Univ., Halifax (Nova Scotia). Inst. of Oceanography.
For primary bibliographic entry see Field 02L.
W74-03434

ORBITAL VELOCITY ASSOCIATED WITH WAVE ACTION NEAR THE BREAKER ZONE,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02J.
W74-03444

LABORATORY INVESTIGATIONS OF WHITECAPS, SPRAY AND CAPILLARY WAVES,
Florida Univ., Gainesville. Coll. of Engineering.
For primary bibliographic entry see Field 02E.
W74-03506

BED FORMS GENERATED IN THE LABORATORY UNDER AN OSCILLATORY FLOW: ANALYTICAL AND EXPERIMENTAL STUDY,
Army Coastal Engineering Research Center, Washington, D.C.
M. R. Carstens, F. M. Neilson, and H. D. Altinbilek.
Technical Memorandum No. 28, June 1969. 105 p, 24 fig, 12 tab, 23 ref, 2 append. DA-149-055CIVENG-65-1.

Descriptors: Flow, Sands, *Sediment transport, *Beds under water, *Dunes, *Waves (Water).
Identifiers: *Oscillatory flow, Alluvial channels, Drag coefficients.

The purpose was to study experimentally bedforms in a bed of uniform sand in an oscillatory-flow water tunnel. Experiments were organized to study incipient motion evolution of a duned bed, geometry of equilibrium dunes, and energy dissipation in the flow over a duned bed. The incipient-motion condition, on both a duned and flat bed, was analyzed by considering lift, drag, and submerged weight forces on a typical surface particle. An analytical expression was derived for the critical velocity. Rational expressions were derived for the widely used Shields diagram which is based on experimental findings. The evolution of a flat bed into a duned bed was observed. A ripple system forms spontaneously all over the bed if the maximum velocity is greater than the critical velocity. Geometry of equilibrium dunes was determined from side-elevation photographs and point-gage traverses over the bed. The ratios of dune amplitude to dune wave length were found to be unique functions of a single variable - ratio of water motion amplitude to mean particle diameter. The added energy dissipation with oscillatory flow over a duned bed was compared with oscillatory flow over a smooth flat bed by measurement of work input into the tunnel. Results were presented in terms of difference in boundary-drag coefficients between the duned and smooth bed. The magnitude of such coefficients is greatly influenced by the choice of a reference velocity. A velocity in the vicinity of the bed deformation is a more rational reference than a velocity far from the bed such as the mean velocity in unidirectional flow. (Sinha-OEIS)
W74-03612

PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL. HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. G. Housley.
Available from NTIS as AD-646 501, for $6.00 paper copy, $1.45 microfiche. Research Report No. 2-3, March 1965. 67 p, 25 fig, 3 tab, 6 ref, 3 append.

Descriptors: *Hawaii, Model studies, *Waves (Water), *Tsunamis, *Bores, *Harbors, Bays, Coasts, *Resonance, Hydraulic models.
Identifiers: Hilo Harbor (HI), Wave generators, Wave absorbers.

Tests were conducted on a pilot model of Hilo Bay to determine whether distortion of scales was appropriate for a tsunami model. The test results showed that a distortion of factor of three had negligible effect on the amplification factor and location of bores within the bay. The tests also showed that a resonant model ocean area was not required for proper generation of the bores. A simple size and fall of water surface at the bay mouth created a strong wave amplification within the bay if the period of oscillation was near that computed for resonant response of the bay. This period depends only on the geometry of the bay. Absorbers can be used between the wave generator and the bay mouth to reduce re-reflected waves; thus, the wave generator can be positioned quite close to the bay mouth. Three memoranda by Keulegan, giving theoretical developments in tsunami model design, are appended. (Sinha-OEIS)
W74-03613

A MODEL STUDY OF THE ENTRANCE CHANNEL DEPOE BAY, OREGON,
Army Coastal Engineering Research Center, Washington, D.C.
J. P. Ahrens.
Available from NTIS as AD-662 000, for $6.00 paper copy, $1.45 microfiche. Technical Memorandum No. 23, September 1967. 25 p, 12 fig, 4 ref.

Descriptors: *Oregon, Harbors, *Coasts, *Bays, Channels, *Waves (Water), Energy, Model studies, Hydraulic models.
Identifiers: Depoe Bay (Or), *Wave action, *Wave energy.

A scale model study was conducted to see if a proposed widening of the entrance channel at Depoe Bay, Oregon would allow appreciably more wave energy to enter the harbor area. A linear, undistorted Froude Scale of 1 to 120 was used. The model was constructed of mortar in a wave tank 72 feet long and 1.5 feet wide, with a stillwater depth of about 1.0 foot in the deeper area beyond the harbor entrance. Ponding in the model bay due to wave action was noted, and in extreme cases exceeded the equivalent of 5 feet prototype. The wave height transmission coefficient for the waves traveling from offshore through the channel and into the bay ranged from greater than 1.0 for long waves to less than 0.1 for short waves. (Sinha-OEIS)
W74-03614

WIND DRIVEN WATER CURRENTS,
Toronto Univ. (Ontario). Dept. of Mechanical Engineering.
W. D. Baines, and D. J. Knapp.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 91, No HY2, Pt 1, Proceedings Paper 4270, p 205-221, March 1965. 8 fig, 7 ref, append.

Descriptors: *Coasts, *Beaches, *Wind pressure, *Shear stress, Turbulent flow, Channel flow, Dispersion, *Currents (Water).
Identifiers: Wind driven currents, Air-sea interaction, Bottom slope, Transverse boundaries, Water depth.

A large body of water is considered over which a flow of air produces a shear stress; the water is otherwise undisturbed. For the two-dimensional case, this flow of air results in a surface current in the direction of the wind and a return current near the bed. From dimensional analysis, it is shown that the shear velocity for the free surface is the basic parameter for dynamic similarity in turbulent flow. Such characteristics as the ratio of surface velocity to shear velocity and the ratio of surface and bed stresses are functions only of the Reynolds number based on shear velocity. A series of experiments were conducted in which the mean flow and turbulence properties were measured in a channel of uniform depth. The distribution of mean velocity was found to be similar to jets at both the surface and the bed, with a relatively static central region. Intensity of turbulence is high and almost uniform across the central region. Dispersion of material in the flow is consequently large although net transport is not. Experiments were also conducted with either a beach or a lateral contraction at the downwind end of the channel. Over the beach there was an appreciable velocity change in the wind direction only near the shoreline. The lateral constriction introduced secondary flow. (Sinha-OEIS)
W74-03619

SURVEY OF GULF COAST STRUCTURAL DAMAGE RESULTING FROM HURRICANE CAMILLE, AUGUST 1969,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
M. E. Crisewell, and R. S. Cummins.
Available from NTIS as AD-707 941, for $3.00 paper copy, $1.45 microfiche. Technical Report N-70-10, April 1970. 154 p, 116 fig, 4 ref. DAHC20-68-W-0192.

Descriptors: Mississippi, Louisiana, *Hurricanes, Storms, *Wind tides, Structures, Damages, *Erosion.
Identifiers: Gulfport (Miss), Hurricane Camille (August 1969).

The damage to structures is described as seen by an inspection team sent to the Mississippi and Louisiana Gulf Coast regions after Hurricane Camille, a very violent but relatively small tropical storm, came ashore west of Gulfport, Mississippi, late on 17 August 1969. Many photographs of the storm damage are included. Extensive damage resulted both from the unusually high winds accompanying Camille and from the extremely high tides coupled with wind-driven waves. Damage was greatest in low areas immediately adjacent to the coastline. Because of uncertainties of the material properties for the various buildings and particularly of the loading, qualitative results are presented. More ductile buildings, such as heavy wooden frame construction, appeared to have sur-

vived the storm best. The storm damage indicated a need for more lateral strength in buildings, especially masonry structures, and for more adequate design of connections and other details. (Sinha - OEIS)
W74-03623

WINDS, WIND SET-UPS, AND SEICHES ON LAKE ERIE,
United States Lake Survey, Detroit, Mich.
I. A. Hunt, Jr.
Available from NTIS as AD-692 800 for $6.00 paper copy, $1.45 microfiche. Technical Report No 1-2, January 1959. 59 p, 23 fig, 6 tab, 9 ref.

Descriptors: *Shore protection, Harbors, *Water levels, *Lake Erie, Wind, *Seiches, *Coasts, *Surges, *Forecasting, New York.
Identifiers: *Atmospheric stability, Wind set-ups, Niagara River.

The prediction of storm water levels on Lake Erie caused by high winds is becoming increasingly important. Engineers must know expected water levels to design harbor improvements and shore protective works. Masters of lake vessels must know the expected variations in water levels to navigate with safety. A knowledge of surges in the Niagara River caused by water level fluctuation is of vital importance to the power entities at Niagara Falls. Lake Erie, the shallowest of all the Great Lakes with an average depth of some 58 feet, has appreciable wind set-ups and presents a challenging problem. Certain factors are described which have not been discussed adequately in previous dissertations concerning winds, wind set-ups, and seiches on Lake Erie. These factors include the importance of atmospheric stability in determining the over-water wind speeds; the effect that Pelee Point and the islands in the western end of the lake have on the flow of displaced water; and the effects which seiches and local disturbances have on the water levels recorded at the gaging sites. Also, a simple, accurate method of forecasting the water level rise at Buffalo is given. (Sinha - OEIS)
W74-03625

PROCEEDINGS OF TENTH CONFERENCE ON COASTAL ENGINEERING, TOKYO, JAPAN, SEPTEMBER, 1966, VOLUME I.

American Society of Civil Engineers, New York, Vol 1, Parts 1 and 2, p 1-789, J. W. Johnson, editor 1967. Price: $12.00/2 vol.

Descriptors: Waves, Sediments, Energy transfer, Wind, Shallow water, Coastal structures, Breakers, Surf, Coasts, Sediment transport, Sedimentation, Coasts, Littoral drift, Conferences.
Identifiers: Wind waves, Wave action.

This is the first of two volumes of papers which constitute the proceedings of the Tenth Conference on Coastal Engineering held in Tokyo, September 1966. It contains papers on studies on theoretical and observed wave characteristics and coastal sediment problems. In remarks at the opening session M. P. O'Brien suggested that the proceedings of these conferences form an encyclopedia of theory, laboratory studies, field observations, design methods, case histories in coastal morphology, and in the lore and knowledge characteristic of an active phase of engineering practice. (See W74-03675 thru W74-03699) (Sinha - OEIS)
W74-03674

NUMERICAL CALCULATION OF WIND WAVES IN SHALLOW WATER,
Kyushu Univ., Fukuoka (Japan). Dept. of Hydraulic Civil Engineering.
T. Ijima, and F. L. W. Tang.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 4, p 38-49, 1967. 10 fig, 4 ref.

Descriptors: *Shallow water, *Waves (Water), *Typhoons, Refraction (Water waves), *Bays, Graphical analysis, Numerical analysis, Fetch, Continental shelf, Forecasting, Coasts.
Identifiers: *Wind waves, Taiwan, Hindcasting, Inland seas.

Numerical calculations of wind waves in shallow water are preferable over the use of graphical methods. Wilson's numerical integration method was extended for use in the calculation of the waves in shallow water. Proposed relationships governing wave generation in shallow water, effect of wave refraction and the forecasting and hindcasting of waves in typhoons are set forth as illustrations of the numerical analyses. (See also W74-03674) (Sinha - OEIS)
W74-03675

OBSERVATIONS OF THE TRANSFORMATION OF OCEAN WAVE CHARACTERISTICS NEAR COASTS BY USE OF ANCHORED BUOYS,
Kyoto Univ. (Japan). Disasters Prevention Research Inst.
H. Higuchi, and T. Kakinuma.
In: Proceedings of Tenth Conference on Coastal Engineering Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 7, p 77-98, 1967. 10 fig, 2 tab, 5 ref, 1 plate.

Descriptors: *Waves (Water), *Shallow water, *Coasts, Photography, *Buoys, Ocean waves.
Identifiers: Japan, *Long waves, *Wave transformation.

To study wave transformation in shallow water a series of wave observations were carried out along some coasts in Japan by photographing two or three convenient buoys aligned in the direction of the waves with two 16 mm cine-cameras. The equipment and methods used in observations and analyses are described together with some of the results obtained. By examining the motion of the buoys off the coast at Shirahama it was found that the method of wave observation by means of anchored buoys was very useful in the case of comparatively long waves. (See also W74-03674) (Sinha - OEIS)
W74-03676

RESPONSE CHARACTERISTICS OF UNDERWATER WAVE GUIDE,
Tokyo Univ. (Japan). Dept. of Civil Engineering.
M. Hom-ma, K. Horikawa, and S. Komori.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 8, p 99-114, 1967. 11 fig, 3 tab, 21 ref.

Descriptors: Underwater, Surface water, *Instrumentation, Water levels, *Shallow water, *Ocean waves.
Identifiers: *Japan (Ohita coast), Wave gages, Correction factor, *Water depth, Progressive waves, Wave pressure, Nearshore, *Wave spectra.

Characteristics are discussed of the correction factor introduced into the relationship between the water surface elevation of progressive waves and its corresponding fluctuation of underwater wave pressure. As a result of extensive investigations conducted both in laboratory and field, it is verified that the correction factor is well expressed by a certain function of relative water depth. By using an empirical formula proposed the power spectrum of surface elevation and its significant wave height off the Ohita Coast are estimated from the record of underwater pressure fluctuation. The estimated values, generally speaking, are in satisfactory agreement with the actual ones determined from the records of surface water elevation. (See also W74-03674) (Sinha - OEIS)
W74-03677

WAVE BOUNDARY LAYERS AND FRICTION FACTORS,
Technical Univ. of Denmark, Copenhagen. Coastal Engineering Lab.
I. G. Jonsson.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 10, p 127-148, 1967. 6 fig, 37 ref.

Descriptors: *Coasts, *Waves (Water), *Friction, *Boundary layers, *Flow characteristics, *Forecasting, Energy loss.
Identifiers: Nearshore, Wave boundary layer, Bottom friction, Roughness.

An attempt is made to re-evaluate and systematize the many observations and the rather few detailed measurements of the phenomena of wave height damping due to bottom friction. In nature the wave boundary layer will always be rough turbulent. This is not necessarily the case in a hydraulic model. The aim is therefore to make it possible to determine the proper flow regime for a pure short-period wave motion over a given bed. Values for the wave friction factor and the wave boundary layer thickness are also proposed. The main results of the study are presented in three diagrams giving flow regimes, friction factors and boundary layer thicknesses. (See also W74-03674) (Sinha - OEIS)
W74-03678

LAMINAR DAMPING OF OSCILLATORY WAVES DUE TO BOTTOM FRICTION,
Kyoto Univ. (Japan). Disasters Prevention Research Inst.
Y. Iwagaki, and Y. Tsuchiya.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 11, p 149-174, 1967. 7 fig, 2 tab, 26 ref.

Descriptors: *Waves (Water), *Boundary layers, Shear stress, Convection, *Shallow water.
Identifiers: *Oscillatory waves, *Bottom friction, *Airy waves, Laminar damping, Wave damping.

The purpose is to discover the mechanism of the laminar damping of oscillatory waves due to bottom friction with the aid of the theory of the laminar boundary layer due to waves and of the measurements of instantaneous shearing stresses exerted on a smooth bottom, resulting from wave motion and wave amplitude attenuation with distance. In a theoretical approach the effects of convective terms involved in the basic equations of laminar boundary layers developing both on the bottom and the side walls of a wave channel are considered on the basis of an approximate solution of the equation, and a theory of the laminar damping of Airy waves is established. In experimental studies, furthermore, direct measurements of instantaneous stresses and observations of wave amplitude attenuation were performed, and the experimental results are compared with both the above theory and the linearized one. (See also W74-03674) (Sinha - OEIS)
W74-03679

DIFFRACTION OF WIND GENERATED WATER WAVES,
Suez Canal Authority Research Center, Ismailia (Egypt).
I. E. Mobarek, and R. L. Wiegel.

n: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japnberra)tember 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 13, p 185-206, 1967. 10 fig, 4 ab, 17 ref.

Descriptors: *Coasts, *Waves (Water), *Breakwaters, *Harbors.
Identifiers: *Wind waves, *Wind generated waves, Diffraction, Wave spectra, Energy spectra.

In designing a harbor an engineer must consider the diffraction of waves. In most studies, only uniform periodic waves coming from a single direction are treated. However, wind generated waves in the ocean are two dimensional, and the diffraction of waves due to a breakwater should be treated with this in mind. As methods of measuring the two-dimensional spectra of waves were developed recently, it was decided to determine whether or not diffraction theory could be applied with sufficient accuracy for two-dimensional wave spectra. The results of a laboratory study presented herein show that a knowledge of the two-dimensional spectra can be used together with diffraction theory to predict the enrgy spectra of waves in the lee of a breakwater within an accuracy that is probably acceptable for many engineering problems. There is a strong evidence supporting the assumption of linearity in the theory of diffraction - as far as many practical considerations are concernced. The diffraction theory can be applied, for some practical purposes, to the two-dimensional spectrum at a harbor entrance to calculate the energy level at the various points inside the harbor. (See also W74-03674) (Sinha - OEIS)
W74-03680

A POSSIBILITY OF GENERATION OF SURF BEATS,
Tokai Univ., Tokyo (Japan). Coll. of Marine Science and Technology.
S. Unoki, and I. Isozaki.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 14, p 207-216, 1967. 6 fig, 8 ref.

Descriptors: *Coasts, *Shores, Waves (Water), *Surf, *Shallow water, Sea level, *Bays.
Identifiers: Swell, Surf beats, Long waves, Shoreline configuration, Oscillations, Bottom topography, *Wave height, Wave period.

Indentations of a shoreline or irregularities of the sea bottom form a small oscillating system of water. When the period of natural oscillation is near that of advancing sea waves a forced standing oscillation develops there, accompanied by an uneven mean surface level of the second order. If the height of the sea waves varies slowly with time, the mean surface fluctuates with the period the same as that of the envelope of the sea waves, and such fluctuation will be sent back offshore as a surf beat when it is released by breaking of the original sea waves. The generated long wave seems to be correlated positively or negatively with the envelope of the sea waves, depending on the topography of the basin and the period of the incident sea waves. A possibility of generation of similar long waves in front of a breakwater or a steep beach is also suggested. (See also W74-03674) (Sinha-OEIS)
W74-03681

A STUDY ON WAVE TRANSFORMATION INSIDE SURF ZONE,
Tokyo Univ. (Japan). Dept. of Civil Engineering.
K. Horikawa, and C-T. Kuo.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 15, p 217-233, 1967. 11 fig, 2 tab, 6 ref.

Descriptors: Surf, *Waves (Water), *Shallow water, Profiles, *Beaches, Graphical analysis, Numerical analysis, Energy loss, Turbulence, Slopes, *Coasts.
Identifiers: Surf zone, *Wave transformation, *Wave height, Bottom friction, Bottom slope.

Wave transformation inside the surf zone is treated analytically under several appropriate assumptions. The theoretical curves computed numerically have a consistent agreement with the experimental data in the case of wave transformation on a horizontal bottom. On the other hand, in the case of wave transformation on a uniformly sloping beach, the analytical treatment seems to be inadequate to clarify the actual phenomena. Data on wave height attenuation are presented in graphic form. (See also W74-03674) (Sinha-OEIS)
W74-03682

WAVE DECAYING DUE TO BREAKING,
Ministry of Agriculture and Forestry, Hiratsuka (Japan). Agricultural Engineering Research Station.
M. Nakamura, H. Shiraishi, and Y. Sasaki.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 16, p 234-253, 1967. 28 fig, 2 tab, 8 ref.

Descriptors: *Waves (Water), *Shallow water.
Identifiers: *Breaker zone, *Wave height, *Wave transformation, Wave decay, Wave length, Wave period, Wave characteristics, *Water depth, Breaking waves.

In this study of wave characteristics at a breaking point consideration is given to wave height, length, period and water depth. The width of the breaker zone, and wave transformation according to changes in water depth are discussed. It is concluded that wave transformation from the deep sea to the shoreline can be estimated by involving the repeated breaking of waves approaching shore. (See also W74-03674) (Sinha-OEIS)
W74-03683

SHOCK PRESSURE OF BREAKING WAVE,
Research Institute for Applied Mechanics, Fukuoka (Japan).
H. Mitsuyasu.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 18, p 268-283, 1967. 5 fig, 1 tab, 11 ref.

Descriptors: *Shallow water, *Waves (Water), *Coasts.
Identifiers: *Shock pressure, *Air cushion, *Breaking waves, Wave pressures, Compression.

Shock pressure due to breaking waves was studied experimentally and analytically for the case of two-dimensional regular oscillatory waves. Important characteristics of shock pressures are described, which were obtained by using the newly designed pressure gauges of very high frequency responses. And the following points are examined: (1) the detailed characteristics of pressure-time histories of shock pressures, and (2) the similarity of pressure-time histories observed simultaneously with two separated gauges. The dynamic models representing the generation mechanism of shock pressure are examined to explain the observed properties of shock pressure, in which the new air-cushion model extended from the original air-cushion model of Bagnold (1939) is included. Under the assumption of small compression of the air cushion, the analytical solutions representing the pressure-time histories are obtained both for the original model of Bagnold (1939) and for the new model. For the cases of relatively high-intensity shock pressure, consistent results were obtained by analyzing the observed shock pressures by the new air-cushion model. A discussion of shock pressure due to finite compression of air cushion is included. (See also W74-03674) (Sinha-OEIS)
W74-03684

THE SHOALING, BREAKING AND RUNUP OF THE SOLITARY WAVE ON IMPERMEABLE ROUGH SLOPES,
Hokkaido Univ., Sapporo (Japan). Dept. of Civil Engineering.
T. Kishi, and H. Saeki.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 21, p 322-348, 1967. 19 fig, 2 tab, 16 ref.

Descriptors: *Shallow water, *Waves (Water), Shore protection, Tsunamis, *Coasts, Bores.
Identifiers: *Solitary waves, *Shoaling, *Breaking waves, Wave characteristics, Wave height, Plunge point, Wave runup.

Variations in wave characteristics of solitary waves in shoaling water are discussed. The transition of wave character from the solitary wave to the bore is basic to the understanding of the problem. Experimental curves representing the transformation of wave height prior to breaking as well as the curves giving the breaker conditions are presented. Theories for the transformation of wave height after breaking and the prediction of the plunge point are presented and compared favorably with the laboratory measurements. Runup heights and wave quantities at the shoreline are measured to compare with the theory of a bore on a dry bed. (See also W74-03674) (Sinha-OEIS)
W74-03685

RUNUP RECIPE FOR PERIODIC WAVES ON UNIFORMLY SLOPING BEACHES,
Scripps Institution of Oceanography, La Jolla, Calif.
W. G. Van Dorn.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 22, p 349-363, 1967. 7 fig, 5 ref.

Descriptors: *Waves (Water), *Shallow water, *Beaches, Slopes, Coasts.
Identifiers: *Wave runup, *Periodic waves, *Shoaling, Nomographs, Prediction.

The shoaling enhancement of small-amplitude, dispersive wave trains traveling over uniform, impermeable slopes was observed in a specially-constructed wave channel, where the reproducible wave elevation measurement accuracy was about .0005-in. These observations substantially support the enhancement predicted from linear theory (conservation of energy flux) except in very shallow water and on very steep slopes, where accelerative effects become important. On the hypothesis that small-amplitude runup theory might be similarly valid for periodic waves of finite height, provided that the positive incident wave amplitude is replaced by the local crest height above still water, this theory was modified to include the effect of the superelevation under a wave crest due to profile asymmetry. The modified theory is shown to agree acceptably with runup observations of larger waves previously reported - both for breaking and non-breaking waves. Because solutions to the modified theory cannot conveniently be obtained by manual calculation, a nomograph chart is included, from which runup predictions can be easily made, given only the wave height, period, and water depth a wavelength or so from shore, and the beach slope. (See also W74-03674) (Sinha-OEIS)
W74-03686

TRANSFORMATION OF SURGES,
Osaka Univ. (Japan). Dept. of Civil Engineering.
A. Murota.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 24, p 382-395, 1967. 12 fig, 9 ref.

Descriptors: *Waves (Water), *Surges, *Bores, *Shallow water.
Identifiers: *Breaking waves, *Wave transformation, Periodic waves, Dispersive waves.

The transient deformation of surges (bores) is discussed. Ideal surges in open channels would normally disperse into periodic waves and be transformed to the undular bore. A train of these dispersive waves may finally reach some stable form e.g. solitary or cnoidal waves. In the transient process, with the development of the undulations, the height of the initial wave would not be constant as has been suggested by Keulegan-Patterson (1940), but would fluctuate in a complicated manner. Regions in which wave crests or troughs can exist are indicated and experimental criteria by which modes of breaking (spilling, surging or plunging) can be determined are listed. The curvature of the wave surface plays a leading role in the mechanism of dispersion and may act as a convective agent in the development of the undulation. (See also W74-03674) (Sinha-OEIS)
W74-03687

ON A COEXISTENCE SYSTEM OF FLOW AND WAVES,
Kobe Univ. (Japan). Dept. of Civil Engineering.
J. Matsunashi.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 26, p 418-433, 1967. 3 fig, 5 ref.

Descriptors: Estuaries, *Fluid flow, *Waves (Water), Equations, *Open channel flow, Mechanical properties.
Identifiers: Bottom friction, Bottom topography, *Oscillation.

The problem of the 'coexistence system' in the case when the forced oscillation of the water surface is superposed on the open channel flow over a fixed bed is discussed. The mechanical properties of the reciprocal action between flow and waves are examined theoretically and experimentally. (See also W74-03674) (Sinha-OEIS)
W74-03688

MODEL STUDIES OF IMPULSIVELY-GENERATED WATER WAVES.
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
J. M. Jordaan, Jr.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 1, Chap 27, p 434-454, 1967. 8 fig, 2 tab, 8 ref.

Descriptors: *Waves (Water), *Earthquakes, *Explosions, Model studies.
Identifiers: *Underwater explosions, Slides, *Dispersive waves.

The wave action due to a sudden impulse in a body of water was studied in a wave basin with beach in the laboratory. Waves were impulsively generated in the 90 ft tank of water, 3 ft. deep, by the impact or sudden withdrawal of a paraboloidal plunger 14 ft. in diameter. The waves had a dominant height of 2 inches and period of 3 seconds, respectively, at a distance of 50 ft. from the plunger. Such waves are scale representations of those generated by sudden impulses in the ocean, such as an underwater nuclear explosion, a sudden change in the ocean bed due to earthquakes, or the impact of a land slide. The waves produced by a downward impulse, or by an underwater explosion, form a dispersive system: whose properties are not constant as in a uniform progressive wave train. Wave periodicities, celerities and wave lengths increase with time of travel and wave heights decrease with travel distance. A theory was developed to predict the wave properties at a given travel time and distance for given source energy, displacement and travel path depth profile (Jordaan 1965). Measurements agree fairly well with prediction. (See also W74-03674) (Sinha-OEIS)
W74-03689

SEDIMENT TRANSPORT AND ACCRETION AROUND THE COASTLINES OF JAPAN,
Western Australia Univ., Nedlands. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W74-03690

MODEL STUDY ON THE FILLING-UP OF A FISHERY HARBOR BY DRIFTING SAND,
Kyoto Univ. (Japan). Disasters Prevention Research Inst.
For primary bibliographic entry see Field 02L.
W74-03691

A PETROGRAPHIC STUDY ON LITTORAL DRIFT ALONG THE ISHIKAWA COAST, JAPAN,
Senshu Univ., Tokyo (Japan).
For primary bibliographic entry see Field 02L.
W74-03692

TRANSPORT PATTERNS IN THE CHAO PHYA ESTUARY,
Waterloopkundig Laboratorium, Delft (Netherlands).
For primary bibliographic entry see Field 02L.
W74-03693

LITTORAL BYPASSING AND BEACH RESTORATION IN THE VICINITY OF PORT HUENEME CALIFORNIA,
Army Engineer District, Los Angeles, Calif. Coastal Engineering Branch.
W. J. Herron, and R. L. Harris.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 38, p 651-675, 1967. 12 fig, 2 tab.

Descriptors: *Bypasses, *Waves (Water), *Coastal structures, *Breakwaters, Littoral, *California.
Identifiers: Port Hueneme (Ca), *Sand bypassing, Wave height, Diffraction patterns.

Port Hueneme Harbor, California, constructed in 1940, resulted in the average annual erosion of 1,200,000 cubic yards from the shoreline downcoast of the harbor. The cause was diversion by the north jetty of the harbor of littoral sand movement into the Hueneme canyon. A sand bypass system was established in 1960-61 by construction, one mile upcoast, of Channel Islands Harbor fronted by an offshore breakwater 2,300 feet in length and located on the 30-foot-depth contour. This breakwater serves a dual function of sheltering the harbor entrance and acting as a littoral sand trap. Three cycles of biennial littoral sand bypassing have been successfully completed resulting in supply of 11,000,000 cubic yards of sand to the eroding shoreline at an average annual cost of $0.40 per cubic yard, including annual maintenance and amortization of structures. Comparison of design of the structure to the impounding characteristics experienced during three bypass cycles indicates that the dimensions and capacity of a sand trap formed by an offshore breakwater can be based upon the diffraction patterns of prevailing wave trains at the two ends of the structure and is independent of the depth and dimensions of the entrapment area. Rate of impoundment is equal to the rate of littoral drift at Port Hueneme. (See also W74-03674) (Sinha-OEIS)
W74-03694

EQUILIBRIUM FLOW AREAS OF TIDAL INLETS ON SANDY COASTS,
California Univ., Berkeley. Coll. of Engineering.
M. P. O'Brien.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 1, Part 2, Chap 39, p 676-686, 1967. 3 fig, 1 tab, 1 ref.

Descriptors: United States, *Inlets (Waterways), *Waves (Water), Jetties, *Sedimentation, Flow, Stabilization, Surf, *Littoral drift, Tides, Coastal structures.
Identifiers: Tidal prism, *Tidal currents, *Wave action, Bed load.

The data cited pertain to inlets in equilibrium under tidal currents on the mainland coasts of the United States. Conclusions are: (1) The equilibrium minimum flow area of an inlet, with or without jetties, is controlled by the tidal prism. A reduction of the tidal prism by sedimentation, vegetation, or artificial fill will reduce the flow area. (2) If the tidal area is connected to the sea through two or more inlets, closure of one or more of these channels will enlarge the flow area of the others. (3) Jetties not only stabilize the position of an inlet but also protect it against closure under wave action. (4) Very small inlets can be kept open by tidal currents, if they are protected against strong surf and littoral drift. (5) The equilibrium flow area of an inlet depends to a minor extent, if at all, on bed material size. (6) Tractive force does not appear to provide a meaningful criterion for the equilibrium conditions of tidal inlets. (See also W74-03674) (Sinha-OEIS)
W74-03695

SUSPENDED SEDIMENT IN A TIDAL ESTUARY,
Liverpool Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W74-03696

DEPOSITIONAL BEHAVIOR OF FINE SEDIMENT IN A TURBULENT FLUID MOTION,
Massachusetts Inst. of Tech., Cambridge. Hydrodynamics Lab.
For primary bibliographic entry see Field 02J.
W74-03697

MATHEMATICAL SIMULATION OF BOTTOM SEDIMENT MOTION BY WAVES,
National Research Council of Canada, Ottawa (Ontario). Hydraulics Section.
For primary bibliographic entry see Field 02J.
W74-03698

PROCEEDINGS OF TENTH CONFERENCE ON COASTAL ENGINEERING, TOKYO, JAPAN, SEPTEMBER, 1966. VOLUME II.

American Society of Civil Engineers, New York, Vol 2, Parts 3 and 4, p 793-1546, J. W. Johnson, Editor, 1967. Price: $12.00 per 2 vols.

Descriptors: *Coastal engineering, Structures, *Sedimentation, *Estuaries, Diffusion, River flow, Littoral drift, Salinity, Shore protection, Beach erosion, Bays, Harbors, Inlets (Water-

ways), Tidal effects, Ocean waves, Saline water intrusion, Tracers, Model studies, Conferences, *Waves (Water).
Identifiers: Flushing.

This is the second of two volumes of papers which constitute the proceedings of the Tenth Conference on Coastal Engineering held in Tokyo, September 1966. It contains papers on studies on coastal structures and related problems and coastal engineering problems. (See W74-03674 and W74-03700 thru W74-03705) (Sinha-OEIS)
W74-03699

SHORE PROTECTION ON THE COAST OF 'YAIZU',
Fisheries Agency, Tokyo (Japan). Fishing Port Div.
G. Seo, and T. Fukuchi.
In: Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September 1966, American Society of Civil Engineers, New York, Vol 2, Part 3, Chap 67, p 1183-1200, 1967. 15 fig.

Descriptors: Coasts, *Beach erosion, Bays, *Waves (Water), *Tides, *Currents (Water), Shore protection.
Identifiers: Pacific Ocean, Yaizu Coast, *Japan, Suruga Bay.

The history of beach erosion and the countermeasures against it extending over the last few centuries on the coast of 'YAIZU' Fishing Port are described. A study is included on the causes of erosion by analysing geographical, topographical and oceanographical conditions of the coastal area. (See also W74-03699) (Sinha-OEIS)
W74-03700

HYDRAULIC SURVEY AND MODEL INVESTIGATION OF THE INNER RANA FJORD,
Norges Tekniske Hoegskole, Trondheim. River and Harbor Lab.
For primary bibliographic entry see Field 02L.
W74-03701

SALINITY DISTRIBUTION AND EFFECT OF FRESH WATER FLOWS IN THE HOOGHLY RIVER,
Central Water and Power Research Station, Poona (India).
For primary bibliographic entry see Field 02L.
W74-03702

STUDIES ON SALT WEDGE BY ULTRASONIC METHOD,
Hokkaido Univ., Sapporo (Japan). Dept. of Engineering Science.
For primary bibliographic entry see Field 02L.
W74-03703

PREDICTED FLUSHING TIMES AND POLLUTION DISTRIBUTION IN THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W74-03704

PRELIMINARY RESULTS AND COMPARISON OF DYE TRACER STUDIES CONDUCTED IN HARBORS, ESTUARIES, AND COASTAL WATERS,
Naval Oceanographic Office, Washington, D.C.
For primary bibliographic entry see Field 05B.
W74-03705

RESPONSE CHARACTERISTICS OF TOKYO BAY TO INCIDENT LONG WAVES,
Central Research Inst. of Electric Power Industry, Tokyo (Japan).
For primary bibliographic entry see Field 02L.
W74-03706

DAMS AND BEACH-SAND SUPPLY IN SOUTHERN CALIFORNIA,
California Univ., Santa Barbara. Dept. of Geology.
For primary bibliographic entry see Field 02J.
W74-03708

MODELS PREDICT ENVIRONMENT.
For primary bibliographic entry see Field 02L.
W74-03713

8C. Hydraulic Machinery

COASTAL SAND MINING IN NORTHERN CALIFORNIA, U.S.A.,
Army Coastal Engineering Research Center, Washington, D.C.
O. T. Magoon, J. C. Haugen, and R. L. Sloan.
Reprint No 16-73, Reprinted from Proceedings of 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B. C., Canada: American Society of Civil Engineers Publication, Chapter 87, p 1571-1597, 1972. 21 fig, 1 tab, 14 ref.

Descriptors: *Sands, *Beaches, *California, *Mining, Dredging, Aggregates, Coastal engineering.
Identifiers: *Sand mining.

The commercial mining of sand at coastal locations along California has been a continuing activity at some sites, sporadic at others, and altogether discontinued at still other sites. This mining activity includes all methods of sand mining (dragline, self-propelled bottom-dump scrapers, diesel shovels, etc.) and may be classified by littoral zone location as (1) mining from a beach foreshore or backshore area wetted by the normal tidal range, (2) mining within a river mouth or other estuary upstream from the ocean but still within the tidal zone, and (3) mining from bluff or dune areas not wetted by the normal range of tides but still within the littoral system. Monterey Bay area has the highest concentration of mining activity. To the north, the area around Fort Bragg yields significant quantities to the commercial miner. Most of the remaining coastal sand mining activity is concentrated in the San Francisco area. (Knapp-USGS)
W74-03371

A DYNAMIC PROGRAMMING--SIMULATION STRATEGY FOR THE CAPACITY EXPANSION OF HYDROELECTRIC POWER SYSTEMS,
Stanford Univ., Calif. Dept. of Civil Engineering.
J. Kuiper, and L. Ortolano.
Water Resources Research, Vol 9, No 6, p 1497-1510, December 1973. 1 fig, 5 tab, 5 ref.

Descriptors: *Water resources development, *Hydroelectric power, *Dynamic programming, *Simulation analysis, Powerplants, Reservoirs, Storage capacity, Operating costs, Planning, River basins, Methodology, Mathematical models, Systems analysis.
Identifiers: *Capacity expansion, *Cost minimization, Brazil.

Two approximate but very efficient, new techniques are presented which solve some major difficulties encountered with conventional power planning methods. Traditional means usually employ a detailed simulation model to study system operation, and engineering judgment to analyze alternatives. Such detailed simulation limits the number of alternatives possible to investigate, and the lack of a systematic procedure for considering alternatives, such as possible sequences of long-term power development, may hinder the making of economically optimum decisions. The capacity expansion of a mixed hydrothermal power system is analyzed by means of dynamic programming to compare alternative sequences of power development and by means of a fast running, approximate simulation model to evaluate the operation of possible power system states in the dynamic programming model. Because the simulation of all states in the dynamic programming model is too time consuming, only selected states are simulated, and these states are identified by using an iterative solution procedure. The resulting 'dynamic programming--simulation strategy' is applied to a preliminary planning of the expansion of a mixed hydrothermal power system in Brazil. The solution procedure is computationally efficient and leads to a substantial reduction in the estimated cost of a future sequence of power development. (Bell-Cornell)
W74-03470

CONVERSION SYSTEM FOR PROVIDING USEFUL ENERGY FROM WATER SURFACE MOTION,
D. T. Richeson.
U.S. Patent No 3,758,788, 4 p, 5 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 914, No 2, p 740, September 11, 1973.

Descriptors: *Patents, *Waves (Water), *Ocean waves, *Energy conversion, Surfaces, Hydraulic structures.
Identifiers: Water surfaces, Buoyant structures.

Wave motion may be converted to energy by the method presented. A device is described for converting random motion at the surface of a body of water to a usable form of energy so as to compress fluid, displace fluid or provide electrical energy. Buoyant structures are provided defining pairs of opposed surfaces affixed together by pivotal structures with energy means, e.g. bellows, held spaced-apart from the pivot device. The bellows are actuated with displacements between the buoyant structures, to develop positive fluid pressures to accomplish various operations. (Sinha - OEIS)
W74-03669

8D. Soil Mechanics

COASTAL SAND MINING IN NORTHERN CALIFORNIA, U.S.A.,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 08C.
W74-03371

8F. Concrete

HYDRAULIC FRACTURING AS A TOOL FOR DISPOSAL OF WASTES IN SHALE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05E.
W74-03231

8H. Rapid Excavation

MODEL STUDIES OF IMPULSIVELY--GENERATED WATER WAVES.
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W74-03689

8I. Fisheries Engineering

REARING BAIT FISHES IN THE ROCKY MOUNTAIN STATES,
Colorado State Univ., Fort Collins.
S. A. Flickinger.

Available from NTIS, Springfield, Va. 22151 as COM-72-11311 - Price $3.00 printed copy; $1.45 microfiche. Project Completion Report to Colorado Dept of Natural Resources and NOAA, National Marine Fisheries Service, March 1971. 129 p.

Descriptors: *Minnows, *Colorado, *Bait fishing, Fish reproduction, Fish management, Ecology, Fish populations, Baits, Fish farming, Aquatic habitats, Fish diseases, Fish harvest.
Identifiers: *Fathead minnows.

Current literature related to distribution of the fathead minnow in Colorado was reviewed. Past studies have covered only distribution in generally local situations, general life history characteristics, and points for further study. The fathead minnow is found in all five of the major river drainages of Colorado, although this species is native only to eastern slope drainages. The community containing the fathead minnow is typical of species normally found in slow or standing water. There were no specific associations which could not be attributed to habitat preferences of the individual species. Consistent associations of other species with the fathead minnow were noted only in cases involving ubiquitous species. In general, the community lacks definite structure, but interpretation is hampered by lack of information on the position and role of the different species in the ecosystem. (See W74-03262 thru W74-03270) (Knapp-USGS)
W74-03261

DETERMINE THE PRESENT VOLUME AND VALUE OF BAIT FISH SALES BY SPECIES IN COLORADO AND ADJACENT MOUNTAIN STATES,
Colorado State Univ., Fort Collins.
S. A. Flickinger.
In: Rearing Bait Fishes in the Rocky Mountain States, Project 6-2-D-11, p 1-24, 1971. 33 ref, append.

Descriptors: *Minnows, *Colorado, *Bait fishing, *Fish farming, Fish management, Baits.

Bait minnow culture was studied by visiting the Fish Farming Experimental Station, Stuttgart, Arkansas, Bureau of Sport Fisheries and Wildlife. Colorado bait fish dealers were interviewed. A total of 25 active and four inactive retailers and two active wholesalers were contacted. The available literature sources were reviewed. The sale of bait minnows in Colorado at present is not a big business. Further development of the bait minnow business is dependent on greater utilization of existing warm water fisheries resources and full exploitation of proposed structures that will provide warm-water habitat. (See also W74-03261) (Knapp-USGS)
W74-03262

DISTRIBUTION AND COMMUNITY RELATIONSHIPS OF THE FATHEAD MINNOW (PIMEPHALES PROMELAS) IN COLORADO AND ADJACENT MOUNTAIN STATES,
Colorado State Univ., Fort Collins.
A. K. Andrews.
In: Rearing Bait Fishes in the Rocky Mountain States, Project 6-2-D-2, p 25-56, 1971. 2 fig, 13 tab, 57 ref, append.

Descriptors: *Minnows, *Colorado, *Bait fishing, Fish reproduction, Fish management, Ecology, Fish populations, Baits, Fish farming, Aquatic habitats, Fish diseases, Fish harvest.
Identifiers: *Fathead minnows.

Current literature related to distribution of the fathead minnow in Colorado was reviewed. Past studies have covered only distribution in generally local situations, general life history characteristics, and points for further study. The fathead minnow is found in all five of the major river drainages of Colorado, although this species is native only to eastern slope drainages. The community containing the fathead minnow is typical of species normally found in slow or standing water. There were no specific associations which could not be attributed to habitat preferences of the individual species. Consistent associations of other species with the fathead minnow were noted only in cases involving ubiquitous species. In general, the community lacks definite structure, but interpretation is hampered by lack of information on the position and role of the different species in the ecosystem. (See also W74-03261) (Knapp-USGS)
W74-03263

CONSTRUCTION OF EXPERIMENTAL BAIT FISH CULTURE PONDS,
Colorado State Univ., Fort Collins.
S. A. Flickinger.
In: Rearing Bait Fishes in the Rocky Mountain States, Project 6-2-D-3, p 57-58, 1971.

Descriptors: *Minnows, *Colorado, *Bait fishing, *Fish farming, Fish management, Baits.

Since utilization of a variety of farm ponds scattered throughout different areas was undesirable for studying bait fish farming in Colorado, it was necessary to construct 11 experimental ponds in one location. Additional construction to complement the pond facility included two cement holding tanks and a small storage shed. The use of a variety of farm ponds scattered throughout different areas would introduce too many variables to adequately analyze the results. Surface water for supplying farm ponds in Colorado is generally insufficient with tremendous fluctuations. Farm ponds are typically not capable of being drained. (See also W74-03261) (Knapp-USGS)
W74-03264

GROWTH AND MORTALITY OF THE FATHEAD MINNOW AS RELATED TO POPULATION DENSITY IN PRODUCTION PONDS,
Colorado State Univ., Fort Collins.
S. A. Flickinger.
In: Rearing Bait Fishes in the Rocky Mountain States, Subproject 6-2-D-4, p 59-61, 1971.

Descriptors: *Minnows, *Colorado, *Bait fishing, *Fish farming, Fish management, Baits.

Individual spawning sites were constructed and female fathead minnows for use as brood fish were secured for a study of growing fathead minnows for bait in Colorado. Weekly determinations of water temperatures and dissolved oxygen levels were made. A complete harvest was made immediately after ice melt. The effects of population density, selective harvesting, and winter mortality on yields and survival were tested. (See also W74-03261) (Knapp-USGS)
W74-03265

LAKE DISTRIBUTION IN COLORADO AND COMMUNITY RELATIONSHIPS OF THE FATHEAD MINNOW IN TWO LAKE POPULATIONS,
Colorado State Univ., Fort Collins.
S. A. Flickinger.
In: Rearing Bait Fishes in the Rocky Mountain States, Subproject 6-2-D-5, p 62-69, 1971. 2 fig, 2 tab.

Descriptors: *Minnows, *Colorado, *Bait fishing, Fish reproduction, Fish management, Ecology, Fish populations, Baits, Fish farming, Aquatic habitats, Fish diseases, Fish harvest.
Identifiers: *Fathead minnows.

The availability of spawning sites appears to be a limiting factor in the warm water population of fathead minnows. The habitats in which fathead minnows were found in the greatest abundance were shallow (10 feet in depth or less), having dense growths of Elodea canadensis with some Potamogeton richardsonius, and characteristically a substrate of granite overlain with 1 to 2 feet of muck and detritus. The aquatic vegetation was generally confined to water depths of 10 feet and less. The greatest amount of spawning activity was recorded between June 16 and July 21. Generally, the immature fish ate a higher percentage of plant material than the adult fish. At the beginning of the sampling the adults consumed nearly 100% animal material. Gradually this trend reversed until by the last of July the fish were consuming nearly 100% vegetable material. (See also W74-03261) (Knapp-USGS)
W74-03266

SELECTION OF THE OPTIMUM BROOD FISH DENSITY AND SEX RATIOS OF THE FATHEAD MINNOW (PIMEPHALES PROMELAS) UNDER PRESCRIBED SPAWNING CONDITIONS,
Colorado State Univ., Fort Collins.
S. A. Flickinger.
In: Rearing Bait Fisheries in the Rocky Mountain States, Subproject 6-2-D-6, p 70-79, 1971. 1 fig, 4 tab.

Descriptors: *Minnows, *Colorado, *Bait fishing, Fish reproduction, Fish management, Ecology, Fish populations, Baits, Fish farming, Aquatic habitats, Fish diseases, Fish harvest.
Identifiers: *Fathead minnows.

To increase the production of fathead minnow fry, it was hypothesized that either the brood fish population density could be increased, the sex ratio could be altered, or more intensive spawning techniques could be developed. The first two alternatives were studied simultaneously by stocking four population densities in combination with three sex ratios. The lowest population density (25,000 fish per surface acre) was by far the most productive density; there was a slight superiority to a sex ratio of 6 females to 1 male. The predicted optimum combination was 32,300 fish per surface acre with a sex ratio of 7.1 females to 1 male giving a maximum production of 3,281,320 fry. Fathead minnows will spawn at any depth up to 5 feet. Spawning boards can be placed without reference to the pond bottom. When spawning space is not limited, territorial conflict is not sufficient to reduce spawning activity. (See also W74-03261) (Knapp-USGS)
W74-03267

THE LIFE HISTORY OF THE FATHEAD MINNOW (PIMEPHALES PROMELAS) IN COLORADO AND ADJACENT MOUNTAIN STATES,
Colorado State Univ., Fort Collins.
A. K. Andrews.
In: Rearing Bait Fishes in the Rocky Mountain States, Subproject 6-2-D-7, p 80-94, 1971. 3 fig, 6 tab.

Descriptors: *Minnows, *Colorado, *Bait fishing, Fish reproduction, Fish management, Ecology, Fish populations, Baits, Fish farming, Aquatic habitats, Fish diseases, Fish harvest.
Identifiers: *Fathead minnows.

Day length is the major controlling factor in the initiation of spawning activity of fathead minnows. There are no reliable means of estimating potential egg production per female. Estimated reproductive potential is sufficient to account for differences in the estimated population of the two study lakes. There were no significant differences in the sizes of male, female, and immature fish from the two populations. The average life span of this species is 2-3 years. The existence of subpopulations and movement within a particular lake is dependent on the presence of desirable habitat. The coldwater environment has discontinuous

avorable habitat and the fish established stable ubpopulations during the summer months while he converse was true for the fish representing the varm water environment. Fathead minnows select nimal material early in the spring and gradually hift to a herbivorous diet as the year progresses. See also W74-03261) (Knapp-USGS)
W74-03268

DISTRIBUTION IN COLORADO, COMMUNITY RELATIONSHIPS, AND PRELIMINARY LIFE HISTORY OF THE WHITE SUCKER (CATOSTOMUS COMMERSONI)--JULY 1, 1968 TO JUNE 30, 1969,
Colorado State Univ., Fort Collins.
M. R. Carpenter.
In: Rearing Bait Fishes in the Rocky Mountain States, Subproject 6-2-D-8, p 95-102, 1971. 51 ref.

Descriptors: *Suckers, *Baits, *Colorado, *Fish farming, Ecology, Fish populations, Aquatic habitats, Fish behavior, Fish diseases, Fish harvest, Fish reproduction, Bait fishing.
Identifiers: White sucker.

The white sucker (Catostomus commersoni) is being used as a bait fish in many states. Colorado has much of its fishing waters impounded in reservoirs, and with the present trend more of Colorado's water will be impounded. White suckers would make a good bait fish for fishing in impounded waters. Suckers generally spawn in streams, but they also spawn in lakes. Suckers spawn in well aerated riffle or shoal areas in the spring and summer when the water temperatures range from 50 deg to 65 deg. Suckers are noted for their spring spawning migrations up tributary streams during the spring. Predation by game-fish on suckers is restricted to the fry stage. The white sucker is distributed from Georgia to Hudson Bay, west to Colorado and north to the Northwest Territories and west to the Farser and Skeena River drainages of British Columbia. In Colorado it is in the South Platte, North Platte, Laramie, Colorado, Gunnison, and Arkansas River drainages. (See also W74-03261) (Knapp-USGS)
W74-03269

DISTRIBUTION IN COLORADO, COMMUNITY RELATIONSHIPS, AND PRELIMINARY LIFE HISTORY OF THE WHITE SUCKER (CATOSTOMUS COMMERSONI)--JULY 1, 1969 TO JANUARY 31, 1970,
Colorado State Univ., Fort Collins.
M. R. Carpenter.
In: Rearing Bait Fishes in the Rocky Mountain States, Subproject 6-2-D-8, p 105-129, 1971. 2 fig, 4 tab, 58 ref.

Descriptors: *Suckers, *Baits, *Colorado, *Fish farming, Ecology, Fish populations, Aquatic habitats, Fish behavior, Fish diseases, Fish harvest, Fish reproduction, Bait fishing.
Identifiers: *White sucker.

The white sucker (Catostomus commersoni) is being used as a bait fish in many states. Colorado has much of its fishing waters impounded in reservoirs, and with the present trend more of Colorado's water will be impounded. White suckers would make a good bait fish for fishing in impounded waters. Suckers generally spawn in streams, but they also spawn in lakes. Suckers spawn in well aerated riffle or shoal areas in the spring and summer when the water temperatures range from 50 deg to 65 deg. Suckers are noted for their spring spawning migrations up tributary streams during the spring. Predation by game-fish on suckers is restricted to the fry stage. The white sucker is distributed from Georgia to Hudson Bay, west to Colorado and north to the Northwest Territories and west to the Fraser and Skeena River drainages of British Columbia. In Colorado it is in the South Platte, North Platte, Laramie, Colorado, Gunnison, and Arkansas River drainages. (See also W74-03261) (Knapp-USGS)
W74-03270

THE FEEDING ECOLOGY OF THE ROCK GREENLING, HEXAGRAMMOS LAGOCEPHALUS, IN THE INSHORE WATERS OF AMCHITKA ISLAND, ALASKA,
Washington Univ., Seattle. Coll. of Fisheries.
For primary bibliographic entry see Field 02I.
W74-03505

WATER CIRCULATION SYSTEM FOR FRESH WATER FISH HUSBANDRY,
Marine Protein Corp., New York. (Assignee).
For primary bibliographic entry see Field 05D.
W74-03659

TROPICAL BAY IN DANGER,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
For primary bibliographic entry see Field 06G.
W74-03716

FARMING THE SEA,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
C. P. Idyll.
Sea Frontiers, Vol 18, No 2, p 107-116, March-April 1972. 8 photo.

Descriptors: *Aquatic animals, *Brood stock, *Breeding, *Fish hatcheries, *Aquiculture, Aquatic habitats, Fish, Fisheries, Fish management, Oysters, Spawning, Fish farming, Shellfish farming, Shrimp, Lobsters, Mussels, Commercial fishing.
Identifiers: Aquatic farming.

Although hunting on land as a method of obtaining food a thousand years ago was abandoned in favor of farming, man still obtains most of his seafood from hunting. But aquatic farming is becoming more common, particularly in land scarce Asia. Many species of fish are unmanageable for farming. For example, tuna need large quantities of food and a great deal of ocean for maneuvering. Despite the unrealistic concepts of enclosing the deeper parts of the ocean, there are still tremendous amounts of marshland available. The ultimate aim of fish farming should be to control the animal during every phase of its life. Brood stock should be maintained in captivity and spawning controlled. Natural selection should be possible, so that brood animals can be chosen for size, flavor, rapid growth, resistance to disease and other desireable characteristics. While not providing some of the above qualities, some of the species currently being developed by sea farmers are oysters, shrimp, eels, yellowtail fish and mussels. In view of the tremendous strides in aquifarming made in a relatively short time, rapidly improving skills should soon increase its trivial contribution of the past. (Ritchie-Florida)
W74-03717

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

WATER LAW AND ITS RELATIONSHIP TO ENVIRONMENTAL QUALITY: A BIBLIOGRAPHY OF SOURCE MATERIAL,
Colorado State Univ., Ft. Collins. Dept. of Economics.
For primary bibliographic entry see Field 05G.
W74-03322

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES, SERIES I: LEGISLATIVE AND REGULATORY REPORTS.
Environmental Protection Agency, Washington, D.C. Office of International Activities.
For primary bibliographic entry see Field 05G.
W74-03383

10F. Preparation of Reviews

EFFECTS OF RESIDUAL CHLORINE ON AQUATIC LIFE,
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 05C.
W74-03298

ARTIFICIAL RECHARGE--STATE OF THE ART,
Geological Survey, Lubbock, Tex.
For primary bibliographic entry see Field 04B.
W74-03354

SUBJECT INDEX

2 4 5-T
Photodecomposition of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) in Water,
W74-03585 5B

ABSORPTION
Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

Compost for Removing Oil Films from Water,
W74-03658 5D

ACID-BASE EQUILIBRIUM
Thermodynamics of Acid-Base Equilibria. m' and p' Hydroxybenzaldehyde,
W74-03738 2K

ACIDS
Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

Comparison of Field and Sigma-Inductive Models for the Transmission of Nonconjugative Substituent Effects. The 2,6-Spiro (3,3) Heptyl System,
W74-03737 2K

ACTIVATED CARBON
Iodine Treated Activated Carbon and Process of Treating Contaminated Water Therewith,
W74-03651 5D

Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

ACTIVATED SLUDGE
Oxygen Activated Sludge Wastewater Treatment Systems: Design Criteria and Operating Experience,
W74-03496 5D

ADENOSINE TRIPHOSPHATE
Quantitative Extraction of Adenosine Triphosphate From Cultivable and Host-Grown Microbes: Calculation of Adenosine Triphosphate Pools,
W74-03570 5A

ADMINISTRATION
Investigation of the Public and Private Interests in the Chesapeake Bay Area,
W74-03332 6B

Useful Waters for California.
W74-03504 5G

Criminal Offenses--Pollution).
W74-03722 6E

Municipalities--Lake Authorities.
W74-03734 6E

ADMINISTRATIVE AGENCIES
Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974, Parts 1 and 2.
W74-03710 6E

ADMINISTRATIVE REGULATIONS
Sewerage Districts and Sewerage District Boards.
W74-03411 6E

AERATION
Power Input for the Surface Aerator in Waste Water Treatment Plants (Prikon povrchoveho aeracniho michadla pro cisteni odpadnich vod),
W74-03555 5D

Big Plant Will Treat Waste With Pure Oxygen.
W74-03638 5D

Phosphorous Removal from Wastewater,
W74-03667 5D

AERATORS
Power Input for the Surface Aerator in Waste Water Treatment Plants (Prikon povrchoveho aeracniho michadla pro cisteni odpadnich vod),
W74-03555 5D

AERIAL PHOTOGRAPHY
Surface Characteristics of Windrows,
W74-03618 2L

AEROBIC BACTERIA
Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

AEROBIC CONDITIONS
An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

AEROBIC TREATMENT
Big Plant Will Treat Waste With Pure Oxygen.
W74-03638 5D

AESTHETICS
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

AGRICULTURAL CHEMICALS
Kings County Economic Community Development Association V. Hardin (Payment of Farm Subsidies Do Not Require Nepa Approval).
W74-03417 6E

AGRICULTURE
Agricultural Reconnaissance Supplement to the Mill Creek Development Project.
W74-03488 6D

AIR CUSHION
Shock Pressure of Breaking Wave,
W74-03684 8B

AIRPORTS
Establishment of Airports on Public Waters and Reclaimed Lands.
W74-03731 6E

AIRY WAVES
Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

ALABAMA
Subsurface Disposal of Liquid Industrial Wastes in Alabama--A Current Status Report,
W74-03227 5E

Camp V. Milam (Action to Force Non-Lake-Front Owner to Remove Boathouse from Lake Shore).
W74-03408 6E

ALASKA
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

The Feeding Ecology of the Rock Greenling, Hexagrammos lagocephalus, in the Inshore Waters of Amchitka Island, Alaska,
W74-03505 2I

ALGAE
Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

The Coastal Shoals of Western Cuba and Their Deposits,
W74-03443 2L

Toxicity of Lead Nitrate to Algae,
W74-03595 5C

Control of Aquatic Plant Life,
W74-03653 4A

Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

Recycling Wastes for Mariculture,
W74-03714 5G

ALGAL BIOCENOSES
In Situ Experimental Investigations of the Biomass Production of Micro-Algae and of Natural Algal Biocoenoses in Flowing Waters, (In German),
W74-03598 5C

ALGAL CONTROL
Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

ALGAL GROWTH
Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

ALGICIDES
Control of Aquatic Plant Life,
W74-03653 4A

Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

ALLUVIUM
Effects of Waste Percolation of Groundwater in Alluvium Near Barstow, California,
W74-03228 5E

ALTERATION OF FLOW
Howe V. Di Pierro Manufacturing Co., Inc. (Appeal by Defendants from an Order Enjoining Them from Flooding Plaintiff's Property).
W74-03402 6E

ALUMINUM
Removal of Phosphate from Waste Water by Aluminum and Iron, Phase III,
W74-03208 5D

pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

AMMONIA
Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

Water Circulation System for Fresh Water Fish Husbandry,
W74-03659 5D

AMMONIFICATION
Effect of Phosphate and Chloride Salts on Ammonification in Waterlogged Soils,
W74-03445 2G

AMPHIDROMIC TIDE WAVES
Approach of Tides to the Hawaiian Islands,
W74-03620 2E

ANAEROBIC BACTERIA
Dissimilatory Reduction of Inorganic Sulfur by Facultatively Anaerobic Marine Bacteria,
W74-03597 5C

Glucose and Pyruvate Metabolism of Spirochaeta litoralis, an Anaerobic Marine Spirochete,
W74-03600 5B

ANALYSIS
Comparative Analysis of Residential Water Use in Puerto Rico,
W74-03324 6D

ANALYSIS OF VARIANCE
One-Way Analysis of Variance,
W74-03292 7C

ANALYTICAL TECHNIQUES
Analyzing the Environmental Impacts of Water Projects.
W74-03472 6G

Recent Studies of Mercury Analysis Procedures for Mill Effluents,
W74-03542 5A

An Investigation of Atomic Absorption Analysis of Mill Effluent Metal Ion Content,
W74-03543 5A

Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

Review of Rapid BOD Test Methods,
W74-03557 5A

ANCHOVIES
The Anchovy Crisis,
W74-03473 6C

ANIMAL BEHAVIOR
A Sensitive Bio-Behavioral Assay for Methyl Mercury,
W74-03572 5A

ANIMAL METABOLISM
DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

ANODIC STRIPPING VOLTAMMETRY
Complexing Capacity of Natural Water - Its Significance and Measurement,
W74-03578 5A

AOAC METHODS
Direct Fluorescent-Antibody Technique for the Microbiological Examination of Food and Environmental Swab Samples for Salmonellae,
W74-03569 5A

APHANOTHECE
Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

AQUATIC ANIMALS
Farming the Sea,
W74-03717 8I

AQUATIC FUNGI
Control of Aquatic Plant Life,
W74-03653 4A

AQUATIC HABITATS
A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

Observations on the Ecology and Distribution of the Turbellarian Fauna of the Danube Delta (Beobachtungen uber die Okologie und Verbreitung der Turbellarienfauna im Donaudelta),
W74-03574 5C

AQUATIC INSECTS
The Influences of an Urban Area and a Reservoir on Benthic Macroinvertebrate Production in the Des Moines River, Iowa,
W74-03209 5C

Analysis of the Benthic Macroinvertebrate Community Structure for Assessment of Water Quality of Des Moines River,
W74-03210 5C

The Chironomids of the Periphyton in the Yugoslav Part of the River Danube (Die Chironomidenfauna aus dem Periphyton in der jugoslawischen Donaustrecke),
W74-03562 5A

AQUATIC LIFE
Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

The Feeding Ecology of the Rock Greenling, Hexagrammos lagocephalus, in the Inshore Waters of Amchitka Island, Alaska,
W74-03505 2I

State Shell-Fisheries.
W74-03732 6E

AQUATIC MICROORGANISMS
The Construction of a Sand Profile Sampler: Its Use in the Study of the Vorticella Populations and the General Interstitial Microfauna of Slow Sand Filters,
W74-03286 5A

AQUATIC WEED CONTROL
Control of Aquatic Plant Life,
W74-03653 4A

Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

AQUEOUS SOLUTIONS
Photodecomposition of P-Chlorophenoxyacetic Acid,
W74-03583 5B

Comparison of Field and Sigma-Inductive Models for the Transmission of Nonconjugative Substituent Effects. The 2,6-Spiro (3,3) Heptyl System,
W74-03737 2K

Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

AQUICLUDES
Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

AQUICULTURE
Farming the Sea,
W74-03717 8I

State Shell-Fisheries.
W74-03732 6E

AQUIFER MODELS
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

AQUIFERS
Effect of Formation Dip on the Movement of Fresh Water Stored in Saline Aquifers,
W74-03336 4B

ARIZONA
Design and Operation of Land Treatment Systems for Minimum Contamination of Groundwater,
W74-03223 5D

Proposed Municipal Waste Water--Groundwater Exchange, City of Tucson: Avra-Marana Valley.
W74-03340 5G

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

ARKANSAS RIVER VALLEY (COLO.)
Use of Finite-Difference Arrays of Observation Wells to Estimate Evapotranspiration from Ground Water in the Arkansas River Valley, Colorado,
W74-03508 2D

AROCLORS
Element Specific Gas Chromatographic Analyses of Organochlorine Pesticides in the Presence of PCB's by Selective Cancellation of Interfering Peaks,
W74-03589 5A

ARTIFICIAL LAKES
Camp V. Milam (Action to Force Non-Lake-Front Owner to Remove Boathouse from Lake Shore).
W74-03408 6E

ARTIFICIAL RECHARGE
Underground Waste Management and Artificial Recharge, Volumes 1 and 2.
W74-03222 5E

Design and Operation of Land Treatment Systems for Minimum Contamination of Groundwater,
W74-03223 5D

Saline Aquifers--Future Storage Reservoirs for Fresh Water,
W74-03224 5E

Artificial Recharge in United Kingdom with Special Reference to London Basin,
W74-03225 4B

Underground Waste Disposal and Artificial Recharge in Japan,
W74-03226 5E

Role of Borehole Geophysics in Underground Waste Storage and Artificial Recharge,
W74-03229 5E

Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

Modification of Artificially Recharged Water in Switzerland,
W74-03234 5B

Underground Storage and Retrieval of Fresh Water from A Brackish-Water Aquifer,
W74-03237 4B

Movement and Accumulation of Suspended Sediment During Basin Recharge,
W74-03240 4B

Artificial Recharge--State of the Art,
W74-03354 4B

Artificial Recharge of Coastal-Plain Aquifer in Israel,
W74-03356 4B

Dan Region, Israel, Sewage-Reclamation and Recharge Project,
W74-03359 5D

Laboratory Facility for Studies Related to Artificial Recharge,
W74-03360 4B

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

ASHEVILLE (N.C)
Water and Sewer Study: Part 2 Plans and Programs, Summary Report Buncombe County, North Carolina.
W74-03645 5G

ATLANTIC COASTAL PLAINS
Organic Compounds in Soil Water of Some Ultisols of the Atlantic Coastal Plain,
W74-03494 2G

ATMOSPHERIC STABILITY
Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

ATOMIC ABSORPTION SPECTROPHOTOMETRY
Modified Atomic Absorption Spectroscopic Methods in Analyses of Trace Metals (Modifizierte atomabsorptionsspektroskopische Methoden zur Metallspuren-Analytik),
W74-03586 5A

ATTITUDES
Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

User Attitudes Toward Water Quality and Price, Las Vegas Valley and Reno-Sparks, Nevada,
W74-03331 5G

Changing Attitudes in Water Resources Development in the Province of Manitoba,
W74-03747 6B

AUSTRALIA
Structure and Texture of a Gravelly Barrier Island in the Fitzroy Estuary, Western Australia, and the Role of Mangroves in the Shore Dynamics,
W74-03351 2L

Immediate Resumption of Growth by Radiata Pine After Five Months of Minimal Transpiration During Drought,
W74-03519 2D

AUTOMATIC CONTROL
A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

BACILLUS SUBTILIS
Synchronous Cultures of Bacillus subtille Obtained by Filtration With Glass Fiber Filters,
W74-03599 5A

BACTERIA
Role of Bacteria in Decomposition of Injected Liquid Waste at Wilmington, North Carolina,
W74-03246 5B

The Microcalorimetry of Microbial Growth,
W74-03273 5A

Sterile Culture Techniques for Species of the Rotifer Asplanchna,
W74-03316 5A

Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

Synchronous Cultures of Bacillus subtille Obtained by Filtration With Glass Fiber Filters,
W74-03599 5A

Iodine Treated Activated Carbon and Process of Treating Contaminated Water Therewith,
W74-03651 5D

BACTERIAL INTERACTIONS
Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

BACTERIAL PHYSIOLOGY
Dissociation in a Marine Pseudomonad,
W74-03566 5A

BACTERIOPHAGE
Production of Bacteriophage by Lyophilized and Oxygen-Exposed Escherichia coli,
W74-03575 5A

BAIT FISHING
Rearing Bait Fishes in the Rocky Mountain States,
W74-03261 8I

Determine the Present Volume and Value of Bait Fish Sales by Species in Colorado and Adjacent Mountain States,
W74-03262 8I

Distribution and Community Relationships of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03263 8I

Construction of Experimental Bait Fish Culture Ponds,
W74-03264 8I

Growth and Mortality of the Fathead Minnow as Related to Population Density in Production Ponds,
W74-03265 8I

Lake Distribution in Colorado and Community Relationships of the Fathead Minnow in Two Lake Populations,
W74-03266 8I

Selection of the Optimum Brood Fish Density and Sex Ratios of the Fathead Minnow (Pimephales Promelas) under Prescribed Spawning Conditions,
W74-03267 8I

The Life History of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03268 8I

BAITS
Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1968 to June 30, 1969,
W74-03269 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1969 to January 31, 1970,
W74-03270 8I

BALTIC SEA
Morphometric Analysis of Short-Period Changes in the Topography of the Shore,
W74-03341 2J

The Relationships Between Wind Records, Energy of Longshore Drift, and Energy Balance Off the Coast of a Restricted Body of Water, As Applied to the Baltic,
W74-03431 2J

Stagnant Sea,
W74-03712 5C

BALTIC SEA (SAMBIAN PENINSULA)
Dynamics and Morphology of the Sambian Peninsula,
W74-03462 2J

BANK EROSION
Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

BANK STABILITY
Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

BARK
Effect of Bark Addition on the Dewatering Properties of Biological Sludges.
W74-03544 5D

BARRAGE
The Effects of Water Conservation Works on the Regime of Morecambe Bay,
W74-03483 4A

BARRIER ISLANDS
Structure and Texture of a Gravelly Barrier Island in the Fitzroy Estuary, Western Australia, and the Role of Mangroves in the Shore Dynamics,
W74-03351 2L

Character and Stability of a Natural Tidal Inlet,
W74-03365 2L

Characteristics of Sedimentary Environments in Moriches Bay,
W74-03707 2L

BARSTOW (CALIF)
Effects of Waste Percolation of Groundwater in Alluvium Near Barstow, California,
W74-03228 5E

BASINS
Stagnant Sea,
W74-03712 5C

BATON ROUGE (LA)
Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

BAY OF FUNDY
Tidal Resonance in the Bay of Fundy and Gulf of Maine,
W74-03434 2L

BAYS
Preliminary Report on the Hydrography of the Pensacola Bay Estuary, Florida,
W74-03347 2L

The Nation's Estuaries: San Francisco Bay and Delta, California.
W74-03420 5G

Tidal Resonance in the Bay of Fundy and Gulf of Maine,
W74-03434 2L

Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

The Salinity Regime and Exchange Characteristics of a Shallow Coastal Bay System,
W74-03611 2L

A Model Study of the Entrance Channel Depoe Bay, Oregon,
W74-03614 8B

Long Wave Study of Monterey Bay,
W74-03615 2L

Surface Characteristics of Windrows,
W74-03618 2L

Numerical Calculation of Wind Waves in Shallow Water,
W74-03675 8B

A Possibility of Generation of Surf Beats,
W74-03681 8B

Characteristics of Sedimentary Environments in Moriches Bay,
W74-03707 2L

BEACH CUSPS
Beach Cusps: Response to Plateau's Rule,
W74-03460 2J

BEACH EROSION
Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

Beach Changes, on the Central Texas Coast Associated with Hurricane Fern, September, 1971,
W74-03433 2J

Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

Conditions of Beach Retrogression in a Low-Energy Environment,
W74-03456 2J

Dynamics and Morphology of the Sambian Peninsula,
W74-03462 2J

Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

Shore Protection on the Coast of 'Yaizu',
W74-03700 8B

Dams and Beach-Sand Supply in Southern California,
W74-03708 2J

BEACHES
Morphometric Analysis of Short-Period Changes in the Topography of the Shore,
W74-03341 2J

Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

Character and Stability of a Natural Tidal Inlet,
W74-03365 2L

Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

Remote Sensing in the Study of Coastal Processes,
W74-03373 7B

Note, Access to Public Municipal Beaches: The Formulation of a Comprehensive Legal Approach,
W74-03380 6E

Wave Set-Up on a Beach,
W74-03432 2E

Dynamic Characteristics of West Florida Gulf Coast Beaches,
W74-03437 2J

Tabasco Beach-Ridge Plain: An Eroding Coast,
W74-03441 2J

Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

Equilibrium Beach Profile Scale-Model Relationship,
W74-03457 2J

Topographic Changes in the Surf Zone Profile,
W74-03609 2J

Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

On Singular Boundary Value Problems for the EPD Equation,
W74-03617 2E

Wind Driven Water Currents,
W74-03619 8B

Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

Runup Recipe for Periodic Waves on Uniformly Sloping Beaches,
W74-03686 8B

A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

Dams and Beach-Sand Supply in Southern California,
W74-03708 2J

BEDS UNDER WATER
Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

BENTHIC FAUNA
Bottom Macrofauna in the Goczalkowice Dam Reservoir in the Years 1965-1969,
W74-03271 5C

The Reality of Three British Biotic Indices,
W74-03289 5A

BENTHOS
The Influences of an Urban Area and a Reservoir on Benthic Macroinvertebrate Production in the Des Moines River, Iowa,
W74-03209 5C

Species Diversity of Benthic Macroinvertebrates in the Des Moines River, Iowa,
W74-03211 5C

Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

BERMS
Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

BERYLLIUM
Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

BIBLIOGRAPHIES
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

International Environmental Bibliographies, Series I: Legislative and Regulatory Reports.
W74-03383 5G

BICARBONATE
Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

BIOACCUMULATION
Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

BIOASSAY
Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of Water Quality,
W74-03206 5C

Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

Effects of Pesticides on Euglena gracilis. I. Growth Studies,
W74-03571 5C

A Sensitive Bio-Behavioral Assay for Methyl Mercury,
W74-03572 5A

DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

BIOCHEMICAL OXYGEN DEMAND

Review of Rapid BOD Test Methods,
W74-03557 5A

Sewage Treatment Process,
W74-03657 5D

BIODEGRADATION

Role of Bacteria in Decomposition of Injected Liquid Waste at Wilmington, North Carolina,
W74-03246 5B

Biodegradation of Urea in River Waters Under Controlled Laboratory Conditions,
W74-03287 5B

Upgrading Lagoons,
W74-03495 5D

BIOINDICATORS

Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

The Reality of Three British Biotic Indices,
W74-03289 5A

Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

BIOLOGICAL COMMUNITIES

Species Diversity of Benthic Macroinvertebrates in the Des Moines River, Iowa,
W74-03211 5C

The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

BIOLOGICAL PROPERTIES

Regressions Between Biological Oceanographic Measurements in the Eastern Tropical Pacific and Their Significance to Ecological Efficiency,
W74-03559 5B

BIOMASS (ALGAE)

In Situ Experimental Investigations of the Biomass Production of Micro-Algae and of Natural Algal Biocoenoses in Flowing Waters, (In German),
W74-03598 5C

BIOTIC INDEX

The Reality of Three British Biotic Indices,
W74-03289 5A

BLADEX HEBICIDE

Characterization and Microdetermination of a Water-Soluble Metabolite from Bladex Herbicide by Conversion to 5,5-Dimethylhydantion,
W74-03587 5A

BLEACHING WASTES

Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

New Composite Effluent-Purification Equipment (Novyi kompleks ochistnykh sooruzhenii),
W74-03554 5D

BOGS

An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

BOILERS

Look, No Clarifier,
W74-03220 5F

BOREHOLE GEOPHYSICS

Role of Borehole Geophysics in Underground Waste Storage and Artificial Recharge,
W74-03229 5E

BORES

Pilot Model Study for the Design of Hilo Harbor Tsunami Model. Hydraulic Model Investigation,
W74-03613 8B

Transformation of Surges,
W74-03687 8B

BOTTOM FRICTION

Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

BOTTOM SEDIMENTS

Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

Mathematical Simulation of Bottom Sediment Motion by Waves,
W74-03698 2J

Readily Hydrosable Organic Matter in Bottom Sediments of Lake Baikal, (In Russian),
W74-03715 5C

BOUNDARY DISPUTES

State Shell-Fisheries.
W74-03732 6E

BOUNDARY LAYERS

Wave Boundary Layers and Friction Factors,
W74-03678 8B

Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

BOUNDARY VALUE PROBLEMS

On Singular Boundary Value Problems for the EPD Equation,
W74-03617 2E

BRACKISH WATER

Aquatic Sediment as a Habitat of Emericellopsis, With a Description of an Undescribed Species of Cephalosporium,
W74-03568 5A

BRAZOS RIVER BASIN (TEX)

Dams and Reservoirs in Texas: Part II,
W74-03375 8A

BREAKER ZONE

Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

Wave Decaying Due to Breaking,
W74-03683 8B

BREAKING WAVES

Shock Pressure of Breaking Wave,
W74-03684 8B

The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

Transformation of Surges,
W74-03687 8B

BREAKWATERS

Diffraction of Wind Generated Water Waves,
W74-03680 8B

Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

BREEDING

Farming the Sea,
W74-03717 8I

Elimination of Mosquito-Breeding Places.
W74-03730 6E

BRIDGE CONSTRUCTION

Bridge Construction and Maintenance over or Adjacent to Streams.
W74-03724 6E

BRINE SHRIMP

A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

BRINES
Deep-Well Injection of Desalting-Plant Waste Brine,
W74-03250 5E

BROMINE
Some Data on Fluorine, Bromine, and Iodine Concentrations in Atmospheric Precipitation at Voronezh (Nekotoryye dannyye o soderzhanii ftora, broma i ioda v atmosfernykh osadkakh g. Voronezha),
W74-03251 5A

BROOD STOCK
Farming the Sea,
W74-03717 8I

BUFFALO RIVER (MISS)
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

BUILDING CODES
Legal Factors in Econometric Modeling of Local Floodplain Management Devices in the Connecticut River Basin,
W74-03207 6F

BULKHEADS
Jefferson National Bank at Sunny Isles v. Metropolitan Dade County (Suit Seeking Declaratory Judgment with Respect to Fill Placed in Bay by Plaintiffs).
W74-03429 6E

BUOYS
Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

BURMA
Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility,
W74-03471 3F

BUZZARDS BAY (MASS)
Effects of Particle Size and Wave State on Grain Dispersion,
W74-03344 2L

BYPASSES
Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

CALCITE
Saturated Calcite Solutions from 10 to 40 Deg C: A Theoretical Study Evaluating the Solubility Product and Other Constants,
W74-03525 2K

CALCIUM
The Occurrence of Microturbellaria in Some British Lakes of Diverse Chemical Content,
W74-03282 5C

CALCIUM CARBONATE
Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

Ion Load and Carbonate Equilibrium in the Troitsk Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

CALIBRATIONS
An Inexpensive, Fast Response Current Speed Indicator,
W74-03310 7B

CALIFORNIA
Effects of Waste Percolation of Groundwater in Alluvium Near Barstow, California,
W74-03228 5E

Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

Case History of Mission Bay Inlet, San Diego, California,
W74-03366 8B

Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

California Coastal Zone Conservation Act, Interim Permit Control, General,
W74-03379 6F

The Nation's Estuaries: San Francisco Bay and Delta, California.
W74-03420 5G

Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

North Coastal Area Investigation. South Fork EEL River Study: A Summary of the Public Hearing Comments on the Preliminary Edition Dated January 1968, Final Supplement,
W74-03476 6B

Castaic Lake Area Recreation Development Plan,
W74-03481 6B

The California State Water Project in 1968,
W74-03502 6B

Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

Useful Waters for California.
W74-03504 5G

Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

Long Wave Study of Monterey Bay,
W74-03615 2L

Surface Characteristics of Windrows,
W74-03618 2L

Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

Near-Shore Circulation in the California Current,
W74-03624 2L

Water Facilities for East Orange Area for City of Orange and East Orange County Water District.
W74-03648 3D

Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

Dams and Beach-Sand Supply in Southern California,
W74-03708 2J

CANADA
Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

A Study of Biotropism of Climate in Two Canadian Cities,
W74-03478 5C

Changing Attitudes in Water Resources Development in the Province of Manitoba,
W74-03747 6B

CANADA (MANITOBA)
Waterfowl Habitat Trends in the Aspen Parkland of Manitoba,
W74-03517 4C

CANALS
Taylor V. Askew (Proceeding to Condemn a Cartway Over Lands of Respondents to Connect a Tract of Timblerland Owned by Petitioners).
W74-03404 6E

CAPACITY EXPANSION
A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

CAPILLARY WAVES
Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

CAPITAL COSTS
Verification of Groundwater Capital Costs,
W74-03338 4B

Forest Industry's Environmental Pollution Control in Finland. The Finnish Forest Industry's Water Protection Investment Programme.
W74-03546 5D

CAPITAL IMPROVEMENTS
The Water Resource Management Plan for the AACOG Planning Region, Volume III: Short Range Program 1970-1975.
W74-03644 6B

CARBON
Phosphorous Removal from Wastewater,
W74-03667 5D

CARBON DIOXIDE
Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

CARBONATE ROCKS
Role of Present-Day Waters in the Karstification of Carbonate Rocks on the Crimean Lowland (Rol' sovremennykh vod v zakarstovanii karbonatnykh porod ravninnogo Kryma),
W74-03258 2K

CARBONATES
Oxygen and Carbon Isotope Compositions of Altered Carbonates from the Western Pacific, Core 53.0, Deep Sea Drilling Project,
W74-03352 2J

CASE STUDIES
Upgrading Existing Wastewater Treatment Plants: Case Histories,
W74-03500 5D

CASTAIC LAKE (CALIF)
Castaic Lake Area Recreation Development Plan,
W74-03481 6B

CATIONS
An Investigation of Atomic Absorption Analysis of Mill Effluent Metal Ion Content,
W74-03543 5A

CELL MORPHOLOGY
Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

CELL SIZE
Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

CHANNEL MORPHOLOGY
Response of the Lower Mississippi River to Changes in Valley Slope, Sinuosity and Water Temperature,
W74-03216 2E

CHANNELS
Mercury Pollution and Enforcement of the Refuse Act of 1899 (Part 2).
W74-03558 5G

CHEMICAL ANALYSIS
Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

Investigation of the Chemical Composition of Atmospheric Precipitation in the Vicinity of Yevpatoriya (Issledovaniye khimicheskogo sostava atmosfernykh osadkov v rayone g. Yevpatorii),
W74-03526 2K

Chemical Composition of Water in Agrakhanskiy Bay (O khimicheskom sostave vody Agrakhanskogo zaliva),
W74-03527 2K

CHEMICAL COMPOSITION
Standing Crop of Salt Marshes Surrounding Chincoteague Bay, Maryland-Virginia,
W74-03304 2L

CHEMICAL PRECIPITATION
Removal of Phosphate from Waste Water by Aluminum and Iron, Phase III,
W74-03208 5D

CHEMICAL WASTES
Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

CHEMISTRY OF PRECIPITATION
Investigation of the Chemical Composition of Atmospheric Precipitation in the Vicinity of Yevpatoriya (Issledovaniye khimicheskogo sostava atmosfernykh osadkov v rayone g. Yevpatorii),
W74-03526 2K

CHEMOSTAT CULTURES
Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

CHESAPEAKE BAY
Larvae of the Burrowing Shrimp, Upogebia Affinis, (Crustacea, Decapoda, Upogebiidae) from Virginia Plankton,
W74-03303 2L

Mud Shrimp (Callianassa) Larvae (Crustacea, Decapoda, Callianassidae) from Virginia Plankton,
W74-03307 2L

Investigation of the Public and Private Interests in the Chesapeake Bay Area,
W74-03332 6B

Size Distributions of the Suspended Particles of the Chesapeake Bay Turbidity Maximum,
W74-03436 2L

CHILE
The Anchovy Crisis,
W74-03473 6C

CHINCOTEAGUE BAY
Standing Crop of Salt Marshes Surrounding Chincoteague Bay, Maryland-Virginia,
W74-03304 2L

CHIRONOMIDS
The Chironomids of the Periphyton in the Yugoslav Part of the River Danube (Die Chironomidenfauna aus dem Periphyton in der jugoslawischen Donaustrecke),
W74-03562 5A

CHLORIDES
Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of Water Quality,
W74-03206 5C

Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

Effect of Phosphate and Chloride Salts on Ammonification in Waterlogged Soils,
W74-03445 2G

Suitability of Food Processing Waste Water for Irrigation,
W74-03482 5D

Cleanup of Polluted Rhine River Will Cost Western Europe Billions.
W74-03637 5G

CHLORINATED HYDROCARBON PESTICIDES
Element Specific Gas Chromatographic Analyses of Organochlorine Pesticides in the Presence of PCB's by Selective Cancellation of Interfering Peaks,
W74-03589 5A

CHLORINATION
Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

CHLORINE RESIDUAL
Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

CHLOROPHENOL RED
DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

CHLOROPHENOXYACETIC ACID
Photodecomposition of P-Chlorophenoxyacetic Acid,
W74-03583 5B

CHLOROPHYTA
Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

CIRCULATION
Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

Near-Shore Circulation in the California Current,
W74-03624 2L

CITIES
The Influences of an Urban Area and a Reservoir on Benthic Macroinvertebrate Production in the Des Moines River, Iowa,
W74-03209 5C

Species Diversity of Benthic Macroinvertebrates in the Des Moines River, Iowa,
W74-03211 5C

A Study of Biotropism of Climate in Two Canadian Cities,
W74-03478 5C

Floodplain Lands for Parks and Recreation: A Case Study of Milwaukee,
W74-03491 6B

Municipalities--Lake Authorities.
W74-03734 6E

CLADOPHORA GLOMERATA
Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

CLAY POTS
Saturated Water Flow Through Clay Pots,
W74-03306 3F

CLAYS
Trace-Element Distribution in the Continental-Shelf Sediments off the East Coast of India,
W74-03350 2J

CLEARCUTTING
Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

CLIMATES (BIOTROPISM)
A Study of Biotropism of Climate in Two Canadian Cities,
W74-03478 5C

CLIMATIC DATA
Investigation of Runoff of Kamchatka Rivers Based on Climatic Data (Issledovaniye stoka rek Kamachatki po klimaticheskim dannym),
W74-03259 2E

COAGULATION
pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

Method for Purifying Water,
W74-03652 5D

COASTAL ENGINEERING
Maximum Breaker Height for Design,
W74-03363 8B

Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

Case History of Mission Bay Inlet, San Diego, California,
W74-03366 8B

State of Groin Design and Effectiveness,
W74-03370 8A

Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September, 1966. Volume II.
W74-03699 – 8B

Department of Natural Resources--Divisions.
W74-03728 6E

COASTAL MARSHES
Ontogeny of a Salt Marsh Estuary,
W74-03621 2L

COASTAL PLAINS
California Coastal Zone Conservation Act, Interim Permit Control, General,
W74-03379 6F

Flood Plain Study and Model Flood Plain Ordinance (Final Environmental Impact Statement).
W74-03397 6F

COASTAL-RELATED LEGAL MATTERS
Selected Legal and Institutional Aspects of the Texas Coastal Zone.
W74-03630 6E

COASTAL STRUCTURES
Numerical Calculation of Wave Refraction Digital Computer,
W74-03343 8B

Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

COASTAL WATERS
Jefferson National Bank at Sunny Isles v. Metropolitan Dade County (Suit Seeking Declaratory Judgment with Respect to Fill Placed in Bay by Plaintiffs).
W74-03429 6E

COASTS
Morphometric Analysis of Short-Period Changes in the Topography of the Shore,
W74-03341 2J

Recent Coastal Sedimentation: Central Louisiana Coast,
W74-03345 2L

Coastal Applications of the ERTS-A Satellite,
W74-03374 2J

Note, Access to Public Municipal Beaches: The Formulation of a Comprehensive Legal Approach,
W74-03380 6E

Flood Plain Study and Model Flood Plain Ordinance (Final Environmental Impact Statement).
W74-03397 6F

The Relationships Between Wind Records, Energy of Longshore Drift, and Energy Balance Off the Coast of a Restricted Body of Water, As Applied to the Baltic,
W74-03431 2J

Wave Set-Up on a Beach,
W74-03432 2E

Spectral Analysis of Shallow Water Waves in Lake Michigan,
W74-03439 2H

Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

The Possibility of Calculating the Sand Drift Along a Shallow-Water Coastt. II. Definition of the Basic Concepts and Terms and Formulation of the Problem of Determining the Drift,
W74-03447 2J

The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

The Generation of Edge Waves by Cylindrical Waves Impinging From the Outer Sea,
W74-03451 2E

The Coastal Environment of New England,
W74-03453 2L

Conditions of Beach Retrogression in a Low-Energy Environment,
W74-03456 2J

Equilibrium Beach Profile Scale-Model Relationship,
W74-03457 2J

A Model Study of the Entrance Channel Depoe Bay, Oregon,
W74-03614 8B

Long Wave Study of Monterey Bay,
W74-03615 2L

Wind Driven Water Currents,
W74-03619 8B

Near-Shore Circulation in the California Current,
W74-03624 2L

Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

Wave Boundary Layers and Friction Factors,
W74-03678 8B

Diffraction of Wind Generated Water Waves,
W74-03680 8B

A Possibility of Generation of Surf Beats,
W74-03681 8B

A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

Shock Pressure of Breaking Wave,
W74-03684 8B

The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

Model Study on the Filling-Up of a Fishery Harbor by Drifting Sand,
W74-03691 2L

COEFFICIENT OF EXPANSION
Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

COLD RESISTANCE
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

COLES CREEK (MISS)
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

COLIFORMS
Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

COLLABORATIVE STUDIES
Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

COLOR
pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

COLORADO
Rearing Bait Fishes in the Rocky Mountain States,
W74-03261 8I

Determine the Present Volume and Value of Bait Fish Sales by Species in Colorado and Adjacent Mountain States,
W74-03262 8I

Distribution and Community Relationships of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03263 8I

Construction of Experimental Bait Fish Culture Ponds,
W74-03264 8I

Growth and Mortality of the Fathead Minnow as Related to Population Density in Production Ponds,
W74-03265 8I

Lake Distribution in Colorado and Community Relationships of the Fathead Minnow in Two Lake Populations,
W74-03266 8I

Selection of the Optimum Brood Fish Density and Sex Ratios of the Fathead Minnow (Pimephales Promelas) under Prescribed Spawning Conditions,
W74-03267 8I

The Life History of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03268 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1968 to June 30, 1969,
W74-03269 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1969 to January 31, 1970,
W74-03270 8I

Optimizing Water Use: The Return Flow Issue,
W74-03385 6E

Use of Finite-Difference Arrays of Observation Wells to Estimate Evapotranspiration from Ground Water in the Arkansas River Valley, Colorado,
W74-03508 2D

COLUMBIA RIVER
Predicted Flushing Times and Pollution Distribution in the Columbia River Estuary,
W74-03704 5B

COMPARATIVE COSTS
Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

COMPENSATION
Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

COMPETITION
Competitive Growth of Sewage Organisms,
W74-03567 5C

COMPLEXING CAPACITY
Complexing Capacity of Natural Water - Its Significance and Measurement,
W74-03578 5A

COMPOST
Compost for Removing Oil Films from Water,
W74-03658 5D

COMPREHENSIVE PLANNING
Investigation of the Public and Private Interests in the Chesapeake Bay Area,
W74-03332 6B

Natural Features Element of the Comprehensive Plan: A Plan for Action.
W74-03633 4C

Conservation-Open Space Plan; Amendments to the Springfield Comprehensive Plan.
W74-03634 3D

Metropolitan Development Guide: Protection Open Space--Policy Plan, Program.
W74-03635 6G

Comprehensive Water Systems Needs Plan, 1970-2000, Allegheny County, Pennsylvania.
W74-03650 3D

COMPUTER MODELS
Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

COMPUTER PROGRAMS
One-Way Analysis of Variance,
W74-03292 7C

Numerical Calculation of Wave Refraction Digital Computer,
W74-03343 8B

A Multiple Specific Ion Detector and Analog Data Processor For a Gas Chromatograph Quadrupole Mass Spectrometer System,
W74-03580 2K

Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

CONCAVE PROGRAMMING
Pollution Control and the Behavior of the Firm--A Technical Note,
W74-03749 5G

CONDEMNATION
Harbors and Water-Courses.
W74-03430 6E

CONFERENCES
Proceedings, Mississippi Water Resources Conference, 1973.
W74-03212 5B

Underground Waste Management and Artificial Recharge, Volumes 1 and 2.
W74-03222 5E

Fifth All-Union Symposium on Glaciology (O pyatom obshchesoyuznom glyatsiologicheskom simpoziume),
W74-03260 2C

CONGRESSIONAL HEARINGS
EPA Pollution Regulations and Fuel Shortage: The Impact on Mass Transit.
W74-03711 5G

CONJUNCTIVE USE
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

CONNATE WATER
The Construction of a Sand Profile Sampler: Its Use in the Study of the Vorticella Populations and the General Interstitial Microfauna of Slow Sand Filters,
W74-03286 5A

CONNECTICUT
Zoning--Subdivision of Land.
W74-03723 6E

Bridge Construction and Maintenance over or Adjacent to Streams.
W74-03724 6E

Disposal of Old Vessels and Floating Structures.
W74-03729 6G

Elimination of Mosquito-Breeding Places.
W74-03730 6E

State Shell-Fisheries.
W74-03732 6E

Water Pollution Control.
W74-03733 6E

Municipalities--Lake Authorities.
W74-03734 6E

CONNECTICUT RIVER
Legal Factors in Econometric Modeling of Local Floodplain Management Devices in the Connecticut River Basin,
W74-03207 6F

CONSERVATION
Conservation-Open Space Plan; Amendments to the Springfield Comprehensive Plan.
W74-03634 3D

Metropolitan Development Guide: Protection Open Space--Policy Plan, Program.
W74-03635 6G

CONSTITUTIONAL LAW
Note, Access to Public Municipal Beaches: The Formulation of a Comprehensive Legal Approach,
W74-03380 6E

CONSTRUCTION
Rucker V. Willis (Class Action Seeking to Enjoin Construction of Proposed Marina and Piers).
W74-03415 6E

CONTINENTAL SHELF
Trace-Element Distribution in the Continental-Shelf Sediments off the East Coast of India,
W74-03350 2J

An Instrumentation System to Measure Near-Bottom Conditions on the Continental Shelf,
W74-03353 2J

CONTINENTAL SLOPES
Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

COOLING TOWERS
Nomographs for Thermal Pollution Control Systems,
W74-03329 5D

Hyperbolic Cross Flow Cooling Tower with Basins and Fill Integrated into Shell,
W74-03668 5D

COOLING WATER
Nomographs for Thermal Pollution Control Systems,
W74-03329 5D

COORDINATION
Water Facilities for East Orange Area for City of Orange and East Orange County Water District.
W74-03648 3D

COPPER
Complexing Capacity of Natural Water - Its Significance and Measurement,
W74-03578 5A

CORIANDER
Edaphic Factors and Wilt of Coriander,
W74-03281 5C

CORN
Soil Surface Roughness and Straw Mulch for Maximum Beneficial Use of Rainfall by Corn on a Blackland Soil,
W74-03515 3F

CORN STALK ROT
Effects of Reducing Interplant Competition for Light and Water on Stalk Rot of Corn,
W74-03516 3F

CORRELATION ANALYSIS
Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

COST ANALYSIS
Analysis of Costs of Pollution Control.
W74-03486 5G

COST-BENEFIT ANALYSIS
Legal Factors in Econometric Modeling of Local Floodplain Management Devices in the Connecticut River Basin,
W74-03207 6F

COST-BENEFIT THEORY
Methods of the Calculation of Cost-Benefit in the Construction of Seaports,
W74-03464 6B

COST MINIMIZATION
A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

COSTS
Minimum Cost Design of Water Distribution Systems,
W74-03205 8A

An Inexpensive, Fast Response Current Speed Indicator,
W74-03310 7B

The Pollution Content of American Trade,
W74-03490 5G

Oxygen Activated Sludge Wastewater Treatment Systems: Design Criteria and Operating Experience,
W74-03496 5D

Pretreatment of Poultry Processing Wastes: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03497 5D

In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

Upgrading Existing Wastewater Treatment Plants: Case Histories,
W74-03500 5D

The California State Water Project in 1968,
W74-03502 6B

The Water Resource Management Plan for the AACOG planning Region, Volume II: Urban Water-Related Services.
W74-03643 6B

The Water Resource Management Plan for the AACOG Planning Region, Volume III: Short Range Program 1970-1975.
W74-03644 6B

COUNTING
A New Method for the Estimation of Absolute Microfossil Numbers, with Reference Especially to Diatoms,
W74-03285 5A

COUNTING CHAMBERS
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

CROP PRODUCTION
Economic Benefits from Irrigation,
W74-03487 6C

CRUDE OILS
Containing and Removing Oil Spills on Water,
W74-03670 3A

CRUSTACEANS
Comparative Ecology and Zooplankton of Two Maryland Ponds Including a Congeneric Occurrence of Diaptomus (Calanoida: Copepoda),
W74-03308 5C

Streptocephalus Moorei N. Sp., a New Fairy Shrimp (Anostraca) From Mexico,
W74-03319 2I

CRYSTALLOGRAPHY
Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

CUBA
The Coastal Shoals of Western Cuba and Their Deposits,
W74-03443 2L

CULTIVATED LANDS
Changes in Chemistry of Natural Waters of Cultivated Lands (Izmeneniya khimizma prirodnykh vod kul'turnykh landshaftov),
W74-03257 5B

CULTURES
A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

The Effect of Discontinuous Methanol Addition on the Growth of a Carbon-Limited Culture of Pseudomonas,
W74-03584 5C

Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

Synchronous Cultures of Bacillus subtille Obtained by Filtration With Glass Fiber Filters,
W74-03599 5A

Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

CULTURING TECHNIQUES
Sterile Culture Techniques for Species of the Rotifer Asplanchna,
W74-03316 5A

CURRENT METERS
An Inexpensive, Fast Response Current Speed Indicator,
W74-03310 7B

An Instrumentation System to Measure Near-Bottom Conditions on the Continental Shelf,
W74-03353 2J

CURRENTS (WATER)
Falling Water Level Ripple Marks,
W74-03449 2L

The Effect of Currents on the Mass Transport of Progressive Water Waves,
W74-03455 2L

Wind Driven Water Currents,
W74-03619 8B

Approach of Tides to the Hawaiian Islands,
W74-03620 2E

Longshore Currents and Nearshore Topographies,
W74-03627 2E

Model Study on the Filling-Up of a Fishery Harbor by Drifting Sand,
W74-03691 2L

Shore Protection on the Coast of 'Yaizu',
W74-03700 8B

CYANIDE
Sewage Treatment Apparatus and Method,
W74-03656 5D

CYANOPHYTA
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

CYCLING NUTRIENTS
A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

CYCLONES
A Multispectral Study of an Extratropical Cyclone with Nimbus 3 Medium Resolution Infrared Radiometer Data,
W74-03349 2B

CYTOLOGICAL STUDIES
A New Method for the Estimation of Absolute Microfossil Numbers, with Reference Especially to Diatoms,
W74-03285 5A

A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

DAGESTAN ASSR
Chemical Composition of Water in Agrakhanskiy Bay (O khimicheskom sostave vody Agrakhanskogo zaliva),
W74-03527 2K

DAIRY WASTE MANAGEMENT
The Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W74-03339 5B

DAM CONSTRUCTION
American Falls Dam, Upper Snake River Project, Idaho.
W74-03419 6E

Dam Control Act.
W74-03735 6E

DAM CONTROL
Dam Control Act.
W74-03735 6E

DAM DESIGN
Dams and Reservoirs in Texas: Part II,
W74-03375 8A

Dam Control Act.
W74-03735 6E

DAM FAILURE
Dam Control Act.
W74-03735 6E

DAMS
Dams and Reservoirs in Texas: Part II,
W74-03375 8A

Maintenance of Dams, Levees and Flood Control Works.
W74-03401 6E

Cape Henry Bird Club v. Laird (Action for Injunctive and Declaratory Relief, On Environmental Grounds, Against Federal Dam Project).
W74-03425 6E

Dams and Beach-Sand Supply in Southern California,
W74-03708 2J

DANUBE DELTA
Observations on the Ecology and Distribution of the Turbellarian Fauna of the Danube Delta (Beobachtungen uber die Okologie und Verbreitung der Turbellarienfauna im Donaudelta),
W74-03574 5C

DANUBE RIVER
The Chironomids of the Periphyton in the Yugoslav Part of the River Danube (Die Chironomidenfauna aus dem Periphyton in der jugoslawischen Donaustrecke),
W74-03562 5A

Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

DAPHNIA
A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

DARK BOTTLE METHOD
Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

DATA COLLECTIONS
Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

DATA PROCESSING
One-Way Analysis of Variance,
W74-03292 7C

DDT
DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

DECISION MAKING
Investigation of the Public and Private Interests in the Chesapeake Bay Area,
W74-03332 6B

Aggregates and Externalities: Information Needs for Public Natural Resource Decision-Making,
W74-03474 6B

The Resolution of Uncertainty,
W74-03479 5G

A Guide to Decision Making for Water Resources Management in the San Antonio Region.
W74-03484 6B

Tuning Down the GNP,
W74-03744 6G

DEEPWATER TERMINAL
The Economic Impact of a Deepwater Terminal in Texas,
W74-03489 6B

DEGRADATION (DECOMPOSITION)
Photodecomposition of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) in Water,
W74-03585 5B

Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

DELAWARE
Nitrate and Nitrite in the Surface Waters of Two Delaware Salt Marshes,
W74-03538 5B

DELAWARE BAY
Nitrate and Nitrite in the Surface Waters of Two Delaware Salt Marshes,
W74-03538 5B

DELAWARE RIVER
Master Plan for Water Supply, Bucks County, Pennsylvania, 1970.
W74-03629 3D

DELTAS
Recent Coastal Sedimentation: Central Louisiana Coast,
W74-03345 2L

Biogenic Metamorphosis of Water in Lakes of the Amu-Dar'Ya Delta (O biogennoy metamorfizatsii vody v ozerakh del'ty Amudar'i),
W74-03531 2H

DESALINATION
Method and Apparatus for Purifying Sea Water,
W74-03654 3A

DESALINATION PLANTS
The Optimal Time to Start the Operation of a Desalting Plant in Israel,
W74-03750 3A

DESALINATION WASTES
Deep-Well Injection of Desalting-Plant Waste Brine,
W74-03250 5E

DESIGN
Eagle Eye - New Flowmeter,
W74-03290 7B

An Inexpensive, Fast Response Current Speed Indicator,
W74-03310 7B

DESIGN CRITERIA
Upgrading Lagoons,
W74-03495 5D

Oxygen Activated Sludge Wastewater Treatment Systems: Design Criteria and Operating Experience,
W74-03496 5D

DESIGN DATA
Upgrading Existing Wastewater Treatment Plants: Case Histories,
W74-03500 5D

DESTRATIFICATION
Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

DETECTION LIMITS
An Inexpensive, Fast Response Current Speed Indicator,
W74-03310 7B

DETERGENTS
Soap and Detergent Association V. City of Chicago (Declaratory Action to Set Aside City Ordinance Prohibiting Sale of Phosphate Detergents).
W74-03414 6E

Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

DEVELOPING COUNTRIES
Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility,
W74-03471 3F

DEWATERING
Effect of Bark Addition on the Dewatering Properties of Biological Sludges.
W74-03544 5D

DIAGENESIS
Oxygen and Carbon Isotope Compositions of Altered Carbonates from the Western Pacific, Core 53.0, Deep Sea Drilling Project,
W74-03352 2J

DIATOMS
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

DIATOMS

A New Method for the Estimation of Absolute Microfossil Numbers, with Reference Especially to Diatoms,
W74-03285 5A

Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

Importance of Diatoms in the Present Varve Deposition (Alternation of Annual Layers) of Green Lake (Near Fayetteville, N.Y.), Model of Confined Sedimentation, (In French),
W74-03577 2H

DIBUTYLPHTHALATE

Dibutyl- and Di- (2-Ethylhexyl)Phthalate in Fish,
W74-03590 5A

DIFFERENCE OF MEANS

Procedures for Testing the Difference of Means with Incomplete Data,
W74-03581 7C

DIFFUSION

Features of Horizontal Turbulence in the Littoral Zone of the Ocean,
W74-03452 2E

DINOFLAGELLATES

A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

DISCHARGE

U.S. v. Reynolds Metals Company (Corporate Immunity for Pollution Under Rivers and Harbors Act of 1899),
W74-03426 6E

DISCHARGE (WATER)

The Possibility of Calculating the Sand Drift Along a Shallow-Water Coastt. II. Definition of the Basic Concepts and Terms and Formulation of the Problem of Determining the Drift,
W74-03447 2J

DISPERSION

Dispersion in Hydrologic and Coastal Environments,
W74-03327 5B

Effects of Particle Size and Wave State on Grain Dispersion,
W74-03344 2L

DISPERSIVE WAVES

Model Studies of Impulsively-Generated Water Waves.
W74-03689 8B

DISSOCIATION

Dissociation in a Marine Pseudomonad,
W74-03566 5A

DISSOLVED OXYGEN

Ecological Studies on Dissolved Oxygen and Bloom of Microcystis in Lake Suwa: I. Horizontal Distribution of Dissolved Oxygen in Relation to Drifting of Microcystis by wind,
W74-03524 5C

Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

Sewage Treatment Process,
W74-03657 5D

DISSOLVED SOLIDS

A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

DISTRIBUTION PATTERNS

The Occurrence of Microturbellaria in Some British Lakes of Diverse Chemical Content,
W74-03282 5C

Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

Distribution of Foraminifera Near Pollution Sources in Chaleur Bay,
W74-03596 5B

DIVERSION

Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

DIVISOR

A Conveniently Constructed Divisor for Splitting Low Water Flows,
W74-03522 7B

DOMESTIC WASTES

Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

DOMESTIC WATER

Water Control Apparatus Responsive to Leakage or Overflow Conditions,
W74-03663 4A

DOMINANT ORGANISMS

Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

DRAINAGE

Interstate Drains.
W74-03400 6E

Water Control Apparatus Responsive to Leakage or Overflow Conditions,
W74-03663 4A

Zoning--Subdivision of Land.
W74-03723 6E

DRAINAGE DISTRICTS

Taylor V. Askew (Proceeding to Condemn a Cartway Over Lands of Respondents to Connect a Tract of Timberland Owned by Petitioners).
W74-03404 6E

DRAINAGE SYSTEMS

The Imperiled Everglades,
W74-03720 6G

DREDGING

Mortality of Market-Sized Oysters (Crassostrea Virginica) in the Vicinity of a Dredging Operation,
W74-03305 5C

U.S. v. Stoeco Homes, Inc. (Permanent Restraining Order Enjoining Developer from Conducting Dredge, Fill and Construction Operations).
W74-03427 6E

DROUGHT RESISTANCE (PLANTS)

Physiology of Drought Resistance in the Soybean Plant (Glycine max): I. The Relationship Between Drought Resistance and Growth,
W74-03475 3F

DRY FARMING

The Significance of the Fallow Year in the Dry-Farming System of the Great Konya Basin, Turkey,
W74-03605 3F

DUNES

Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

DYE DISPERSION

Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

DYE RELEASES

Preliminary Results and Comparison of Dye Tracer Studies Conducted in Harbors, Estuaries, and Coastal Waters,
W74-03705 5B

DYNAMIC PROGRAMMING

A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

E. COLI

Quantitative Extraction of Adenosine Triphosphate From Cultivable and Host-Grown Microbes: Calculation of Adenosine Triphosphate Pools,
W74-03570 5A

Production of Bacteriophage by Lyophilized and Oxygen-Exposed Escherichia coli,
W74-03575 5A

EARTHQUAKES

Model Studies of Impulsively-Generated Water Waves.
W74-03689 8B

EASEMENTS
Camp V. Milam (Action to Force Non-Lake-Front Owner to Remove Boathouse from Lake Shore).
W74-03408 6E

EASTERN OYSTER
Mortality of Market-Sized Oysters (Crassostrea Virginica) in the Vicinity of a Dredging Operation,
W74-03305 5C

ECOLOGICAL DISTRIBUTION
Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

Observations on the Ecology and Distribution of the Turbellarian Fauna of the Danube Delta (Beobachtungen uber die Okologie und Verbreitung der Turbellarienfauna im Donaudelta),
W74-03574 5C

ECOLOGICAL STUDIES
Ecological Studies on Dissolved Oxygen and Bloom of Microcystis in Lake Suwa: I. Horizontal Distribution of Dissolved Oxygen in Relation to Drifting of Microcystis by wind,
W74-03524 5C

ECOLOGY
Comparative Ecology and Zooplankton of Two Maryland Ponds Including a Congeneric Occurrence of Diaptomus (Calanoida: Copepoda),
W74-03308 5C

A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

A Bill to Amend the Fish and Wildlife Coordination Act by Providing for Regulation of Dumping in United States Waters.
W74-03390 6E

People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

Physiological Aspects of Animal Life in Estuaries with Special Reference to Salinity,
W74-03461 2L

Coming to Terms with Growth and the Environment,
W74-03465 6B

Observations on the Ecology and Distribution of the Turbellarian Fauna of the Danube Delta (Beobachtungen uber die Okologie und Verbreitung der Turbellarienfauna im Donaudelta),
W74-03574 5C

ECONOMETRICS
Legal Factors in Econometric Modeling of Local Floodplain Management Devices in the Connecticut River Basin,
W74-03207 6F

ECONOMIC EFFICIENCY
Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

Pollution Control and the Behavior of the Firm--A Technical Note,
W74-03749 5G

ECONOMIC GROWTH
Coming to Terms with Growth and the Environment,
W74-03465 6B

Economic Growth and Environmental Decay: The Solution Becomes the Problem,
W74-03492 6B

ECONOMIC IMPACT
Analysis of Costs of Pollution Control.
W74-03486 5G

Economic Benefits from Irrigation,
W74-03487 6C

Agricultural Reconnaissance Supplement to the Mill Creek Development Project.
W74-03488 6D

The Economic Impact of a Deepwater Terminal in Texas,
W74-03489 6B

Economic Growth and Environmental Decay: The Solution Becomes the Problem,
W74-03492 6B

ECONOMICS
Pollution: Economy and Environment,
W74-03493 6B

Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

ECOSYSTEMS
The Feeding Ecology of the Rock Greenling, Hexagrammos lagocephalus, in the Inshore Waters of Amchitka Island, Alaska,
W74-03505 2I

Tropical Bay in Danger,
W74-03716 6G

EDAPHIC FACTORS
Edaphic Factors and Wilt of Coriander,
W74-03281 5C

EDGE WAVES
The Generation of Edge Waves by Cylindrical Waves Impinging From the Outer Sea,
W74-03451 2E

EEL RIVER (CALIF.)
North Coastal Area Investigation. South Fork EEL River Study: A Summary of the Public Hearing Comments on the Preliminary Edition Dated January 1968, Final Supplement,
W74-03476 6B

Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

EFFLUENTS
Water Pollution Control Handbook--A Citizens Guide to the Federal Water Pollution Control Act Amendments of 1972--Volume II,
W74-03388 5G

EGYPT (LAKE MARIUT)
Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

ELECTRIC POWERPLANTS
Look, No Clarifier,
W74-03220 5F

ELECTROCHEMISTRY
Titrimetric Determination of Uranium with Electrogenerated Vanadium (V),
W74-03564 2K

ELECTRODES
Titrimetric Determination of Uranium with Electrogenerated Vanadium (V),
W74-03564 2K

ELECTROGENERATION
Titrimetric Determination of Uranium with Electrogenerated Vanadium (V),
W74-03564 2K

ELECTRON MICROSCOPY
An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

ELECTROPHORESIS
Method for Purifying Water,
W74-03652 5D

ELTONIAN PYRAMID
The Structure of Saprobic Communities,
W74-03746 2I

EMBRYONIC GROWTH STAGE
Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of Water Quality,
W74-03206 5C

EMERICELLOPSIS HUMICOLA
Aquatic Sediment as a Habitat of Emericellopsis, With a Description of an Undescribed Species of Cephalosporium,
W74-03568 5A

EMINENT DOMAIN
Taylor V. Askew (Proceeding to Condemn a Cartway Over Lands of Respondents to Connect a Tract of Timberland Owned by Petitioners).
W74-03404 6E

EMPLOYMENT
Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

EMULSIFIERS
Method of Separating Metals from Waste Water,
W74-03664 5D

EMULSION
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

ENERGY
Coming to Terms with Growth and the Environment,
W74-03465 6B

ENERGY BUDGET
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

EPA Pollution Regulations and Fuel Shortage: The Impact on Mass Transit.
W74-03711 5G

ENERGY CONVERSION
Conversion System for Providing Useful Energy from Water Surface Motion,
W74-03669 8C

ENERGY EQUATION
Power Input for the Surface Aerator in Waste Water Treatment Plants (Prikon povrchoveho aeracniho michadla pro cisteni odpadnich vod),
W74-03555 5D

ENERGY TRANSFER
Water Waves From Underwater Explosions in Shallow Water, Part I: A Mathematical Model for Waves in Constant Depth and in Shoaling Water,
W74-03454 2L

ENGINEERING STRUCTURES
Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

Dam Control Act.
W74-03735 6E

ENTERIC BACTERIA
Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

System for Purification of Polluted Water,
W74-03655 5D

ENVIRONMENT
Pollution: Economy and Environment,
W74-03493 6B

ENVIRONMENTAL CONTROL
Environmental Aspects of Watershed Planning,
W74-03215 6G

Mathematical Modeling of Water Quality,
W74-03217 5B

Soap and Detergent Association V. City of Chicago (Declaratory Action to Set Aside City Ordinance Prohibiting Sale of Phosphate Detergents).
W74-03414 6E

Economic Growth and Environmental Decay: The Solution Becomes the Problem,
W74-03492 6B

ENVIRONMENTAL EFFECTS
Mortality of Market-Sized Oysters (Crassostrea Virginica) in the Vicinity of a Dredging Operation,
W74-03305 5C

The Substantive Right to Environmental Quality Under the National Environmental Policy Act,
W74-03384 6E

Banklick Creek Watershed (Final Environmental Impact Statement).
W74-03398 4D

An Act to Regulate the Transportation for Dumping, and the Dumping of Material into Ocean Water, and for other Purposes.
W74-03399 6E

People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

Rucker V. Willis (Class Action Seeking to Enjoin Construction of Proposed Marina and Piers).
W74-03415 6E

U.S. V. Joseph G. Moretti, Inc. (Land Fills Deemed 'Structures' Under Rivers and Harbors Act of 1899).
W74-03416 6E

Analyzing the Environmental Impacts of Water Projects.
W74-03472 6G

Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

Natural Features Element of the Comprehensive Plan: A Plan for Action.
W74-03633 4C

Intertidal Salt Marshes--Penalty.
W74-03727 6E

Tuning Down the GNP,
W74-03744 6G

ENVIRONMENTAL IMPACT STATEMENT
Banklick Creek Watershed (Final Environmental Impact Statement).
W74-03398 4D

People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

ENVIRONMENTAL IMPACT STATEMENTS
Flood Plain Study and Model Flood Plain Ordinance (Final Environmental Impact Statement).
W74-03397 6F

Analyzing the Environmental Impacts of Water Projects.
W74-03472 6G

Tuning Down the GNP,
W74-03744 6G

ENVIRONMENTAL PROTECTION
Toward Environmental Sanity,
W74-03346 5G

Bridge Construction and Maintenance over or Adjacent to Streams.
W74-03724 6E

EPIFAUNA
The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

EQUILIBRIUM
Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

Equilibrium Beach Profile Scale-Model Relationship,
W74-03457 2J

Ion Load and Carbonate Equilibrium in the Troitsk Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

EQUILIBRIUM WATER TEMPERATURE
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

EROSION
The Old Coastline of the Wash,
W74-03435 2L

Tabasco Beach-Ridge Plain: An Eroding Coast,
W74-03441 2J

Forced Flow Passages in Karst Massifs,
W74-03513 2J

Some Calculations of the Denudation Rate in a Dolomitic Limestone Area at Isfjord-Radio, West-Spitzbergen,
W74-03514 2J

Survey of Gulf Coast Structural Damage Resulting from Hurricane Camille, August 1969,
W74-03623 8B

Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

Tropical Bay in Danger,
W74-03716 6G

EROSION RATES
Some Calculations of the Denudation Rate in a Dolomitic Limestone Area at Isfjord-Radio, West-Spitzbergen,
W74-03514 2J

ESTIMATED BENEFITS
Recreational Demand at Lakes and Reservoirs,
W74-03480 6D

ESTIMATING
Comparative Analysis of Residential Water Use in Puerto Rico,
W74-03324 6D

ESTUARIES
Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

Preliminary Report on the Hydrography of the Pensacola Bay Estuary, Florida,
W74-03347 2L

Mathematical Simulation of Tidal Time-Averages of Salinity and Velocity Profiles in Estuaries,
W74-03348 2L

Tidal Resonance in the Bay of Fundy and Gulf of Maine,
W74-03434 2L

The Old Coastline of the Wash,
W74-03435 2L

Size Distributions of the Suspended Particles of the Chesapeake Bay Turbidity Maximum,
W74-03436 2L

Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

The Coastal Environment of New England,
W74-03453 2L

Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

Physiological Aspects of Animal Life in Estuaries with Special Reference to Salinity,
W74-03461 2L

Water Law of Southeastern Estuaries,
W74-03463 6E

Distribution of Foraminifera Near Pollution Sources in Chaleur Bay,
W74-03596 5B

Methylmercury in Estuarine Sediments,
W74-03602 5B

The Salinity Regime and Exchange Characteristics of a Shallow Coastal Bay System,
W74-03611 2L

Ontogeny of a Salt Marsh Estuary,
W74-03621 2L

Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

Model Study on the Filling-Up of a Fishery Harbor by Drifting Sand,
W74-03691 2L

Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

Suspended Sediment in a Tidal Estuary,
W74-03696 2L

Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September, 1966. Volume II.
W74-03699 8B

Salinity Distribution and Effect of Fresh Water Flows in the Hooghly River,
W74-03702 2L

Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

Predicted Flushing Times and Pollution Distribution in the Columbia River Estuary,
W74-03704 5B

Preliminary Results and Comparison of Dye Tracer Studies Conducted in Harbors, Estuaries, and Coastal Waters,
W74-03705 5B

Characteristics of Sedimentary Environments in Moriches Bay,
W74-03707 2L

Models Predict Environment.
W74-03713 2L

ESTUARINE ENVIRONMENT

Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

The Nation's Estuaries: San Francisco Bay and Delta, California.
W74-03420 5G

Physiological Aspects of Animal Life in Estuaries with Special Reference to Salinity,
W74-03461 2L

ESTUARINE ENVIRONMENTS

The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism,
W74-03626 5C

ETHANOL

Comparison of Field and Sigma-Inductive Models for the Transmission of Nonconjugative Substituent Effects. The 2,6-Spiro (3,3) Heptyl System,
W74-03737 2K

EUGLENA GRACILIS

Effects of Pesticides on Euglena gracilis. I. Growth Studies,
W74-03571 5C

EUROPE

Responsibilities of Local Authorities for Water Pollution Control.
W74-03639 5G

EUTROPHICATION

An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

Lake Restoration.
W74-03536 5C

Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

Stagnant Sea,
W74-03712 5C

EVAPORIMETERS (PICH)

A Practical Method of Calculating Potential Evapotranspiration, (In French),
W74-03721 2D

EVAPOTRANSPIRATION

Use of Finite-Difference Arrays of Observation Wells to Estimate Evapotranspiration from Ground Water in the Arkansas River Valley, Colorado,
W74-03508 2D

A Practical Method of Calculating Potential Evapotranspiration, (In French),
W74-03721 2D

EVERGLADES

The River of Grass is Drying Up,
W74-03718 6G

The Imperiled Everglades,
W74-03720 6G

EXPLOSIONS

Water Waves From Underwater Explosions in Shallow Water, Part I: A Mathematical Model for Waves in Constant Depth and in Shoaling Water,
W74-03454 2L

Model Studies of Impulsively-Generated Water Waves.
W74-03689 8B

EXTERNALITIES

Aggregates and Externalities: Information Needs for Public Natural Resource Decision-Making,
W74-03474 6B

FABRICATION

The Construction of a Sand Profile Sampler: Its Use in the Study of the Vorticella Populations and the General Interstitial Microfauna of Slow Sand Filters,
W74-03286 5A

FAIRY SHRIMP

Streptocephalus Moorei N. Sp., a New Fairy Shrimp (Anostraca) From Mexico,
W74-03319 2I

FARM WASTES

The Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W74-03339 5B

Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

FATHEAD MINNOW

Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

FATHEAD MINNOWS

Rearing Bait Fishes in the Rocky Mountain States,
W74-03261 8I

Distribution and Community Relationships of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03263 8I

Lake Distribution in Colorado and Community Relationships of the Fathead Minnow in Two Lake Populations,
W74-03266 8I

Selection of the Optimum Brood Fish Density and Sex Ratios of the Fathead Minnow (Pimephales Promelas) under Prescribed Spawning Conditions,
W74-03267 8I

The Life History of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03268 8I

FATTY ACIDS

Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

FEASIBILITY STUDIES
Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility,
W74-03471 3F

The Effects of Water Conservation Works on the Regime of Morecambe Bay,
W74-03483 4A

FEDERAL AGENCIES
Toward Environmental Sanity,
W74-03346 5G

FEDERAL GOVERNMENT
Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974, Parts 1 and 2.
W74-03710 6E

FEDERAL PROJECT POLICY
Environmental Aspects of Watershed Planning,
W74-03215 6G

FEDERAL RECLAMATION LAW
American Falls Dam, Upper Snake River Project, Idaho.
W74-03419 6E

FEDERAL WATER POLLUTION CONTROL ACT
Corporate Immunity From Prosecution under the Federal Water Pollution Control Act.
W74-03376 5G

Campaign Clean Water, Inc. v. Ruckelshaus, (Action Brought Against Administrator of Environmental Protection Agency Challenging Impoundment with Respect to Funds Authorized to be Appropriated by Congress).
W74-03424 6E

FEEDING RATES
An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

FERTILIZERS
Monitoring Nutrient Losses from Small Watersheds,
W74-03219 5B

Potential of an Eroding Urban Soil for the Phosphorus Enrichment of Streams: I. Evaluation of Methods,
W74-03438 5B

FILL PERMITS
Tropical Bay in Danger,
W74-03716 6G

FILTERS
Look, No Clarifier,
W74-03220 5F

Synchronous Cultures of Bacillus subtille Obtained by Filtration With Glass Fiber Filters,
W74-03599 5A

FILTRATION
Effect of Bark Addition on the Dewatering Properties of Biological Sludges.
W74-03544 5D

System for Purification of Polluted Water,
W74-03655 5D

Water Circulation System for Fresh Water Fish Husbandry,
W74-03659 5D

Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

Filtration System for Liquids,
W74-03662 5F

Method of Digesting and Further Processing Fresh Sewage Sludge or Sapropel,
W74-03671 5D

FINLAND
Forest Industry's Environmental Pollution Control in Finland. The Finnish Forest Industry's Water Protection Investment Programme.
W74-03546 5D

FISH AND WILDLIFE COORDINATING ACT
A Bill to Amend the Fish and Wildlife Coordination Act by Providing for Regulation of Dumping in United States Waters.
W74-03390 6E

FISH FARMING
Determine the Present Volume and Value of Bait Fish Sales by Species in Colorado and Adjacent Mountain States,
W74-03262 8I

Construction of Experimental Bait Fish Culture Ponds,
W74-03264 8I

Growth and Mortality of the Fathead Minnow as Related to Population Density in Production Ponds,
W74-03265 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1968 to June 30, 1969,
W74-03269 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1969 to January 31, 1970,
W74-03270 8I

Water Circulation System for Fresh Water Fish Husbandry,
W74-03659 5D

FISH FOOD ORGANISMS
The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

The Feeding Ecology of the Rock Greenling, Hexagrammos lagocephalus, in the Inshore Waters of Amchitka Island, Alaska,
W74-03505 2I

FISH HATCHERIES
Farming the Sea,
W74-03717 8I

FISH MANAGEMENT
Intertidal Salt Marshes--Penalty.
W74-03727 6E

FISH PHYSIOLOGY
Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

FJORDS
Hydraulic Survey and Model Investigation of the Inner Rana Fjord,
W74-03701 2L

FLOCCULATION
Depositional Behavior of Fine Sediment in a Turbulent Fluid Motion,
W74-03697 2J

FLOOD CONTROL
The Generation of Flood Damage Time Sequences,
W74-03334 4A

A Bill Authorizing the Construction, Repair, and Preservation of Certain Public Works on Rivers and Harbors for Navigation, Flood Control, and Other Purposes.
W74-03396 6E

Flood Plain Study and Model Flood Plain Ordinance (Final Environmental Impact Statement).
W74-03397 6F

Maintenance of Dams, Levees and Flood Control Works.
W74-03401 6E

Cape Henry Bird Club v. Laird (Action for Injunctive and Declaratory Relief, On Environmental Grounds, Against Federal Dam Project).
W74-03425 6E

The Imperiled Everglades,
W74-03720 6G

Zoning--Subdivision of Land.
W74-03723 6E

Bridge Construction and Maintenance over or Adjacent to Streams.
W74-03724 6E

FLOOD DAMAGE
The Generation of Flood Damage Time Sequences,
W74-03334 4A

FLOOD DATA
Flood Control.
W74-03410 6E

FLOOD FORECASTING
The Generation of Flood Damage Time Sequences,
W74-03334 4A

FLOOD PLAIN ZONING
Legal Factors in Econometric Modeling of Local Floodplain Management Devices in the Connecticut River Basin,
W74-03207 6F

Flood Control.
W74-03410 6E

FLOOD PLAINS
A Bill to Establish a National Flood Plain Policy.
W74-03394 6E

Flood Control.
W74-03410 6E

Floodplain Lands for Parks and Recreation: A Case Study of Milwaukee,
W74-03491 6B

Use of Finite-Difference Arrays of Observation Wells to Estimate Evapotranspiration from Ground Water in the Arkansas River Valley, Colorado,
W74-03508 2D

FLOOD PROTECTION
A Bill to Establish a National Flood Plain Policy.
W74-03394 6E

A Bill Authorizing the Construction, Repair, and Preservation of Certain Public Works on Rivers and Harbors for Navigation, Flood Control, and Other Purposes.
W74-03396 6E

Flood Control.
W74-03410 6E

LOODING
Flood Plain Study and Model Flood Plain Ordinance (Final Environmental Impact Statement).
W74-03397 6F

LOODS
A Bill to Establish a National Flood Plain Policy.
W74-03394 6E

LORIDA
Artificial Recharge of Treated Waste Waters and Rainfall Runoff into Deep Saline Aquifers of Peninsula of Florida,
W74-03242 5E

Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

Preliminary Report on the Hydrography of the Pensacola Bay Estuary, Florida,
W74-03347 2L

Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

Flood Plain Study and Model Flood Plain Ordinance (Final Environmental Impact Statement).
W74-03397 6F

U.S. V. Joseph G. Moretti, Inc. (Land Fills Deemed 'Structures' Under Rivers and Harbors Act of 1899).
W74-03416 6E

Jefferson National Bank at Sunny Isles v. Metropolitan Dade County (Suit Seeking Declaratory Judgment with Respect to Fill Placed in Bay by Plaintiffs).
W74-03429 6E

Wave Set-Up on a Beach,
W74-03432 2E

Dynamic Characteristics of West Florida Gulf Coast Beaches,
W74-03437 2J

Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

Conditions of Beach Retrogression in a Low-Energy Environment,
W74-03456 2J

The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and he Miami Ship Channel,
W74-03610 2L

Tropical Bay in Danger,
W74-03716 6G

The River of Grass is Drying Up,
W74-03718 6G

The Imperiled Everglades,
W74-03720 6G

FLOTATION
Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

FLOW CHARACTERISTICS
Wave Boundary Layers and Friction Factors,
W74-03678 8B

FLOW CONTROL
Multiple Outlet Selective Withdrawal Technique for Water Quality Prediction of Lake Releases,
W74-03218 5B

Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

FLOW RATES
A Conveniently Constructed Divisor for Splitting Low Water Flows,
W74-03522 7B

FLOWMETERS
Eagle Eye - New Flowmeter,
W74-03290 7B

FLUID FLOW
On a Coexistence System of Flow and Waves,
W74-03688 8B

Depositional Behavior of Fine Sediment in a Turbulent Fluid Motion,
W74-03697 2J

FLUORESCENT ANTIBODY TECHNIQUES
Direct Fluorescent-Antibody Technique for the Microbiological Examination of Food and Environmental Swab Samples for Salmonellae,
W74-03569 5A

FLUORINE
Some Data on Fluorine, Bromine, and Iodine Concentrations in Atmospheric Precipitation at Voronezh (Nekotoryye dannyye o soderzhanii ftora, broma i ioda v atmosfernykh osadkakh g. Voronezha),
W74-03251 5A

FLUSHING
Predicted Flushing Times and Pollution Distribution in the Columbia River Estuary,
W74-03704 5B

FOAM SEPARATION
Method for Purifying Water,
W74-03652 5D

FOOD HABITS
Grazing of pseudocalanus minutus on Naturally Occuring Particulate Matter,
W74-03593 5B

FOOD PROCESSING WASTES
Suitability of Food Processing Waste Water for Irrigation,
W74-03482 5D

FOOD WEBS
The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

FORAMINIFERA
Distribution of Foraminifera Near Pollution Sources in Chaleur Bay,
W74-03596 5B

FORECASTING
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

The Relationships Between Wind Records, Energy of Longshore Drift, and Energy Balance Off the Coast of a Restricted Body of Water, As Applied to the Baltic,
W74-03431 2J

Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

The Salinity Regime and Exchange Characteristics of a Shallow Coastal Bay System,
W74-03611 2L

Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

Wave Boundary Layers and Friction Factors,
W74-03678 8B

FOREIGN COUNTRIES
International Environmental Bibliographies, Series I: Legislative and Regulatory Reports.
W74-03383 5G

FOREIGN TRADE
The Pollution Content of American Trade,
W74-03490 5G

FORESTS
Distribution Patterns of Organic Matter in River Waters of the Wooded Tundra Zone (Zakonomernosti raspredeleniya organicheskogo veshchestva rechnykh vod lesotundrovoy zony),
W74-03255 2K

FRANCE (MARSEILLES)
Study of a Polluted Environment (The Old Port Area of Marseilles): The Influence of Physical and Chemical Conditions on the Characteristics of the Population of the Quay, (In French),
W74-03719 5C

FREEZE DRYING
Production of Bacteriophage by Lyophilized and Oxygen-Exposed Escherichia coli,
W74-03575 5A

FRESHWATER FISH
Dibutyl- and Di- (2-Ethylhexyl)Phthalate in Fish,
W74-03590 5A

FRICTION
Wave Boundary Layers and Friction Factors,
W74-03678 8B

FUNGI
Competitive Growth of Sewage Organisms,
W74-03567 5C

GAS CHROMATOGRAPHY
Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

Is Phosphate Reduced to Phosphine in Waterlogged Soils,
W74-03523 2G

Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

Determination of Trace Organics in Air and Water,
W74-03576 5A

A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

A Multiple Specific Ion Detector and Analog Data Processor For a Gas Chromatograph Quadrupole Mass Spectrometer System,
W74-03580 2K

Characterization and Microdetermination of a Water-Soluble Metabolite from Bladex Herbicide by Conversion to 5,5-Dimethylhydantion,
W74-03587 5A

Determination of Trichlorfon (0,0-Dimethyl (2,2,2-Trichloro-1-Hydroxyethyl)Phosphonate) in Forest Environmental Samples,
W74-03588 5A

Element Specific Gas Chromatographic Analyses of Organochlorine Pesticides in the Presence of PCB's by Selective Cancellation of Interfering Peaks,
W74-03589 5A

Dibutyl- and Di- (2-Ethylhexyl)Phthalate in Fish,
W74-03590 5A

GASTROPODS
Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

GEOCHEMISTRY
Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

GEOMETRICAL OPTICS
Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

GEORGIA
City of Midway V. Midway Nursing and Convalescent Center, Inc. (Suit by City to Enjoin Church from Furnishing Water to Nursing Home and Enjoin Nursing Home from Receiving Water from Other Defendants in Competition with City).
W74-03403 6E

Finish Allatoona's Interstate Right, Inc. V. Volpe (Suit to Enjoin Construction of Last Segment of Highway 1-75 Across Portion of Publicly Owned Lake).
W74-03405 6E

GEOTRICHUM CANDIDUM
Competitive Growth of Sewage Organisms,
W74-03567 5C

GERMANIUM
Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

GERMANY
Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

GERMANY (THURINGIA)
In Situ Experimental Investigations of the Biomass Production of Micro-Algae and of Natural Algal Biocoenoses in Flowing Waters, (In German),
W74-03598 5C

GLACIAL DRIFT
Dynamics and Morphology of the Sambian Peninsula,
W74-03462 2J

GLACIOLOGY
Fifth All-Union Symposium on Glaciology (O pyatom obshchesoyuznom glyatsiologicheskom simpoziume),
W74-03260 2C

GLUCOSE
Glucose and Pyruvate Metabolism of Spirochaeta litoralis, an Anaerobic Marine Spirochete,
W74-03600 5B

GOLDFISH
DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

GORGIA
Natural Features Element of the Comprehensive Plan: A Plan for Action.
W74-03633 4C

GOVERNMENT FINANCE
Tuning Down the GNP,
W74-03744 6G

GOVERNMENT INTERVENTION
Resource Allocation, Information Cost and the Form of Government Intervention,
W74-03485 5G

GOVERNMENT SUPPORTS
Kings County Economic Community Development Association V. Hardin (Payment of Farm Subsidies Do Not Require Nepa Approval).
W74-03417 6E

GOVERNMENTAL INTERRELATIONS
People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

GOVERNMENTS
Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

GRAVELS
Structure and Texture of a Gravelly Barrier Island in the Fitzroy Estuary, Western Australia, and the Role of Mangroves in the Shore Dynamics,
W74-03351 2L

GREAT LAKES
A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

GREAT MIAMI RIVER (OHIO)
The Great Miami River Corridor Study: A Concept Plan.
W74-03631 6F

GROINS (STRUCTURES)
State of Groin Design and Effectiveness,
W74-03370 8A

GROSS NATIONAL PRODUCT
Coming to Terms with Growth and the Environment,
W74-03465 6B

Tuning Down the GNP,
W74-03744 6G

GROUND WATER
Use of Finite-Difference Arrays of Observation Wells to Estimate Evapotranspiration from Ground Water in the Arkansas River Valley, Colorado,
W74-03508 2D

GROUNDWATER
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

Verification of Groundwater Capital Costs,
W74-03338 4B

Water Study, Santa Fe Planning Area.
W74-03641 4B

2020 Plan, Board of Water Supply/City and County of Honolulu.
W74-03649 4B

GROUNDWATER BASINS
Artificial Recharge in United Kingdom with Special Reference to London Basin,
W74-03225 4B

GROUNDWATER MINING
2020 Plan, Board of Water Supply/City and County of Honolulu.
W74-03649 4B

GROUNDWATER MOVEMENT
Radioactive- and Chemical-Waste Transport in Groundwater at National Reactor Testing Station, Idaho: 20-Year Case History and Digital Model,
W74-03233 5B

Deduction of Flow Patterns in Variable-Density Aquifers from Pressure and Water-Level Observations,
W74-03236 4B

Retention of Dissolved Constituents of Waste by Geologic Membranes,
W74-03238 5B

Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

GROUNDWATER RESOURCES
Proposed Municipal Waste Water--Groundwater Exchange, City of Tucson: Avra-Marana Valley.
W74-03340 5G

GROUTING
Hydraulic Fracturing As a Tool for Disposal of Wastes in Shale,
W74-03231 5E

GROWTH MEDIA
Sterile Culture Techniques for Species of the Rotifer Asplanchna,
W74-03316 5A

GROWTH RATES
Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

The Microcalorimetry of Microbial Growth,
W74-03273 5A

Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

Competitive Growth of Sewage Organisms,
W74-03567 5C

Effects of Pesticides on Euglena gracilis. I. Growth Studies,
W74-03571 5C

The Effect of Discontinuous Methanol Addition on the Growth of a Carbon-Limited Culture of Pseudomonas,
W74-03584 5C

Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

GROWTH STAGES
Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

GUAYANES RIVER WATERSHED (P.R.)
Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

GULF OF MAINE
Tidal Resonance in the Bay of Fundy and Gulf of Maine,
W74-03434 2L

GULF OF MEXICO
Treatment of Domestic Sewage at Offshore Locations,
W74-03221 5D

GULLY EROSION
Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

GUPPY
Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

HABITATS
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

HARBORS
U.S. v. Stoeco Homes, Inc. (Permanent Restraining Order Enjoining Developer from Conducting Dredge, Fill and Construction Operations).
W74-03427 6E

Harbors and Water-Courses.
W74-03430 6E

The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

Methods of the Calculation of Cost-Benefit in the Construction of Seaports,
W74-03464 6B

The Economic Impact of a Deepwater Terminal in Texas,
W74-03489 6B

Pilot Model Study for the Design of Hilo Harbor Tsunami Model. Hydraulic Model Investigation,
W74-03613 8B

Diffraction of Wind Generated Water Waves,
W74-03680 8B

Model Study on the Filling-Up of a Fishery Harbor by Drifting Sand,
W74-03691 2L

Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

Disposal of Old Vessels and Floating Structures.
W74-03729 6G

HAWAII
Virus Removal in Hawaiian Soils,
W74-03293 5F

Pilot Model Study for the Design of Hilo Harbor Tsunami Model. Hydraulic Model Investigation,
W74-03613 8B

Approach of Tides to the Hawaiian Islands,
W74-03620 2E

2020 Plan, Board of Water Supply/City and County of Honolulu.
W74-03649 4B

HEAT
The Microcalorimetry of Microbial Growth,
W74-03273 5A

HEAVY METALS
Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of Water Quality,
W74-03206 5C

Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

Heavy Metals in the Sediments of the Danube, Ems, Weser and Elbe Rivers in West Germany, (In German),
W74-03552 5B

HEAVY WATER
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

HERBICIDES
Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

Characterization and Microdetermination of a Water-Soluble Metabolite from Bladex Herbicide by Conversion to 5,5-Dimethylhydantion,
W74-03587 5A

HETEROTROPHIC BACTERIA
Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

HIGHWAY EFFECTS
Finish Allatoona's Interstate Right, Inc. V. Volpe (Suit to Enjoin Construction of Last Segment of Highway 1-75 Across Portion of Publicly Owned Lake).
W74-03405 6E

Effects of Highways on Surface and Subsurface Waters,
W74-03607 4C

HIGHWAY RELOCATION
Finish Allatoona's Interstate Right, Inc. V. Volpe (Suit to Enjoin Construction of Last Segment of Highway 1-75 Across Portion of Publicly Owned Lake).
W74-03405 6E

HIGHWAYS
EPA Pollution Regulations and Fuel Shortage: The Impact on Mass Transit.
W74-03711 5G

HUMAN DISEASES
A Study of Biotropism of Climate in Two Canadian Cities,
W74-03478 5C

HURRICANES
Beach Changes, on the Central Texas Coast Associated with Hurricane Fern, September, 1971,
W74-03433 2J

Conditions of Beach Retrogression in a Low-Energy Environment,
W74-03456 2J

Survey of Gulf Coast Structural Damage Resulting from Hurricane Camille, August 1969,
W74-03623 8B

HYDRACARINA
A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

HYDRAULIC MODELS
Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

Models Predict Environment.
W74-03713 2L

HYDROCARBONS
A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

HYDROELECTRIC POWER
A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

HYDROFRACTURING
Effect of Formation Dip on the Movement of Fresh Water Stored in Saline Aquifers,
W74-03336 4B

HYDROGEN BONDING
Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

HYDROGEN ION CONCENTRATION
Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

HYDROGEOLOGY
Artificial Recharge in United Kingdom with Special Reference to London Basin,
W74-03225 4B

Hydrodynamics of Mount Simon Sandstone, Ohio and Adjoining Areas,
W74-03235 5B

Deduction of Flow Patterns in Variable-Density Aquifers from Pressure and Water-Level Observations,
W74-03236 4B

Underground Storage and Retrieval of Fresh Water from A Brackish-Water Aquifer,
W74-03237 4B

Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

Geohydrology of Buried Triassic Basin at Savannah River Plant, South Carolina,
W74-03241 5E

Artificial Recharge of Treated Waste Waters and Rainfall Runoff into Deep Saline Aquifers of Peninsula of Florida,
W74-03242 5E

Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

Hazards of Waste Disposal in Groundwater Basins,
W74-03357 5E

Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

Feasibility Study of Liquid-Waste Injection into Aquifers Containing Salt Water, Wilmington, North Carolina,
W74-03362 5E

Hydrogeologic Considerations in Land Spreading of Sewage Treatment-Plant Effluent in Central Florida,
W74-03518 5D

HYDROGRAPH ANALYSIS
The Generation of Flood Damage Time Sequences,
W74-03334 4A

HYDROGRAPHY
Preliminary Report on the Hydrography of the Pensacola Bay Estuary, Florida,
W74-03347 2L

HYDROLOGIC CYCLE
The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

HYDROLOGIC DATA
The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

HYDROLYSIS
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

HYDROXYBENZALDEHYDE
Thermodynamics of Acid-Base Equilibria. m' and p' Hydroxybenzaldehyde,
W74-03738 2K

HYDRURUS-FOETIDUS
Mass Development of Hydrurus in the Yenisei Below the Krasnoyarsk Reservoir Dam, (In Russian),
W74-03550 4A

HYPOLIMNION
Lake Restoration.
W74-03536 5C

HYPOLIMNION AERATION
Lake Restoration.
W74-03536 5C

ICE
Fifth All-Union Symposium on Glaciology (O pyatom obshchesoyuznom glyatsiologicheskom simpoziume),
W74-03260 2C

ICE COVER
Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

IDAHO
Radioactive- and Chemical-Waste Transport in Groundwater at National Reactor Testing Station, Idaho: 20-Year Case History and Digital Model,
W74-03233 5B

American Falls Dam, Upper Snake River Project, Idaho.
W74-03419 6E

An Evaluation of Water-Quality Data Obtained at Four Streamflow Daily-Record Stations in Idaho,
W74-03507 5A

The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

IGNEOUS ROCKS
Oxygen and Carbon Isotope Compositions of Altered Carbonates from the Western Pacific, Core 53.0, Deep Sea Drilling Project,
W74-03352 2J

ILLINOIS
Deep-Well Injection of Desalting-Plant Waste Brine,
W74-03250 5E

Soap and Detergent Association V. City of Chicago (Declaratory Action to Set Aside City Ordinance Prohibiting Sale of Phosphate Detergents).
W74-03414 6E

City of Champaign v. Environmental Protection Agency (Administrative Proceeding for Alleged Pollution Against City, University Board of Trustees and Others).
W74-03421 6E

Wastewater Land Treatment Site Regulation Act.
W74-03725 6E

Recreational Use of Land and Water Areas--Liability of Owners.
W74-03726 6E

IMMUNITY
Corporate Immunity From Prosecution under the Federal Water Pollution Control Act.
W74-03376 5G

IMPAIRED WATER QUALITY
Kings County Economic Community Development Association V. Hardin (Payment of Farm Subsidies Do Not Require Nepa Approval).
W74-03417 6E

IMPOUNDMENTS
Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

INCIDENT WAVES
The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

INDIA
Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

Trace-Element Distribution in the Continental-Shelf Sediments off the East Coast of India,
W74-03350 2J

Conventional Treatment Methods for Pulp and Paper Mill Wastes and Disposal on Land for Irrigation,
W74-03547 5D

Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

INDIA (GODAVARI ESTUARY)
Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

INDIA (HOOGHLY RIVER)
Salinity Distribution and Effect of Fresh Water Flows in the Hooghly River,
W74-03702 2L

INDIANA
Interstate Drains.
W74-03400 6E

Maintenance of Dams, Levees and Flood Control Works.
W74-03401 6E

Harbors and Water-Courses.
W74-03430 6E

INDICATORS
Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

INDUSTRIAL WASTES
Subsurface Disposal of Liquid Industrial Wastes in Alabama--A Current Status Report,
W74-03227 5E

Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

History of a Two-Well Industrial-Waste Disposal System,
W74-03247 5E

Subsurface Disposal of Waste in Kansas,
W74-03248 5E

Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

INDUSTRIAL WATER
Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

INFORMATION EXCHANGE
Proceedings, Mississippi Water Resources Conference, 1973.
W74-03212 5B

INFRARED RADIATION
A Multispectral Study of an Extratropical Cyclone with Nimbus 3 Medium Resolution Infrared Radiometer Data,
W74-03349 2B

INHIBITION
DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

INJECTION WELLS
Role of Borehole Geophysics in Underground Waste Storage and Artificial Recharge,
W74-03229 5E

Hydraulic Fracturing As a Tool for Disposal of Wastes in Shale,
W74-03231 5E

Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

History of a Two-Well Industrial-Waste Disposal System,
W74-03247 5E

Subsurface Disposal of Waste in Kansas,
W74-03248 5E

Effect of Formation Dip on the Movement of Fresh Water Stored in Saline Aquifers,
W74-03336 4B

Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

Artificial Recharge of Coastal-Plain Aquifer in Israel,
W74-03356 4B

INJUNCTIVE RELIEF
People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

Camp V. Milam (Action to Force Non-Lake-Front Owner to Remove Boathouse from Lake Shore).
W74-03408 6E

Jefferson National Bank at Sunny Isles v. Metropolitan Dade County (Suit Seeking Declaratory Judgment with Respect to Fill Placed in Bay by Plaintiffs).
W74-03429 6E

INLAND WATERWAYS
Tropical Bay in Danger,
W74-03716 6G

INLETS (WATERWAYS)
Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

Character and Stability of a Natural Tidal Inlet,
W74-03365 2L

Case History of Mission Bay Inlet, San Diego, California,
W74-03366 8B

The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

Equilibrium Flow Areas of Tidal Inlets on Sandy Coasts,
W74-03695 8B

INORGANIC COMPOUNDS
Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

INPUT-OUTPUT ANALYSIS
A Guide to Decision Making for Water Resources Management in the San Antonio Region.
W74-03484 6B

Pollution: Economy and Environment,
W74-03493 6B

INSECT CONTROL
Elimination of Mosquito-Breeding Places.
W74-03730 6E

INSTRUMENTATION
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

An Instrumentation System to Measure Near-Bottom Conditions on the Continental Shelf,
W74-03353 2J

Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

Instrumentation for Water Pollution Monitoring,
W74-03640 5D

Circuit for Water Depth Meter,
W74-03666 7B

Response Characteristics of Underwater Wave Guide,
W74-03677 8B

INTERFACES
Deduction of Flow Patterns in Variable-Density Aquifers from Pressure and Water-Level Observations,
W74-03236 4B

INTERNATIONAL AGREEMENTS
Cleanup of Polluted Rhine River Will Cost Western Europe Billions.
W74-03637 5G

INTERNATIONAL LAW
The Draft United Nations Convention on the International Seabed Area - American Bar Association Position,
W74-03377 6E

INTERNATIONAL LAW

International Environmental Bibliographies, Series I: Legislative and Regulatory Reports.
W74-03383 5G

Concurrent Resolution Expressing the Sense of the Congress with Respect to Water Pollution.
W74-03393 6E

A Bill to Implement the International Convention on Civil Liability for Oil Pollution Damage and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage.
W74-03395 6E

INTERNATIONAL TRADE

The Pollution Content of American Trade,
W74-03490 5G

INTERNATIONAL WATERS

Concurrent Resolution Expressing the Sense of the Congress with Respect to Water Pollution.
W74-03393 6E

INTERSTATE

Environmental Law - Water Pollution Remedies - Use of Public Nuisance Theory in Suit by Federal Government - United States V. Ira S. Bushey and Sons, Inc.,
W74-03381 5G

Course of Action Under Federal Common Law for Pollution of Interstate Waters,
W74-03382 5G

INTERSTATE COMMISSIONS

Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam, and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

Ohio River Valley Water Sanitation Commission.
W74-03736 6E

INTERSTATE COMPACTS

Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam, and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

Ohio River Valley Water Sanitation Commission.
W74-03736 6E

INVERTEBRATES

Analysis of the Benthic Macroinvertebrate Community Structure for Assessment of Water Quality of Des Moines River,
W74-03210 5C

The Reality of Three British Biotic Indices,
W74-03289 5A

INVESTMENT

The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

IODINE

Some Data on Fluorine, Bromine, and Iodine Concentrations in Atmospheric Precipitation at Voronezh (Nekotoryye dannyye o soderzhanii ftora, broma i ioda v atmosfernykh osadkakh g. Voronezha),
W74-03251 5A

Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

Iodine Treated Activated Carbon and Process of Treating Contaminated Water Therewith,
W74-03651 5D

IODINE CYCLE

Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

ION EXCHANGE

Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

ION TRANSPORT

Retention of Dissolved Constituents of Waste by Geologic Membranes,
W74-03238 5B

IONIZATION

Thermodynamics of Acid-Base Equilibria. m' and p' Hydroxybenzaldehyde,
W74-03738 2K

IONS

Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

Ion Load and Carbonate Equilibrium in the Troitsk Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

Complexing Capacity of Natural Water - Its Significance and Measurement,
W74-03578 5A

Method and Apparatus for Purifying Sea Water,
W74-03654 3A

IOWA

Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

The Influences of an Urban Area and a Reservoir on Benthic Macroinvertebrate Production in the Des Moines River, Iowa,
W74-03209 5C

Analysis of the Benthic Macroinvertebrate Community Structure for Assessment of Water Quality of Des Moines River,
W74-03210 5C

Species Diversity of Benthic Macroinvertebrates in the Des Moines River, Iowa,
W74-03211 5C

IRON

Removal of Phosphate from Waste Water by Aluminum and Iron, Phase III,
W74-03208 5D

Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

IRRIGATION

Saturated Water Flow Through Clay Pots,
W74-03306 3F

The Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W74-03339 5B

Proposed Municipal Waste Water--Groundwater Exchange, City of Tucson: Avra-Marana Valley.
W74-03340 5G

Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility,
W74-03471 3F

Suitability of Food Processing Waste Water for Irrigation,
W74-03482 5D

Economic Benefits from Irrigation,
W74-03487 6C

Agricultural Reconnaissance Supplement to the Mill Creek Development Project.
W74-03488 6D

IRRIGATION CANALS

The River of Grass is Drying Up,
W74-03718 6G

ISLANDS

Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

ISRAEL

Artificial Recharge of Coastal-Plain Aquifer in Israel,
W74-03356 4B

Dan Region, Israel, Sewage-Reclamation and Recharge Project,
W74-03359 5D

The Optimal Time to Start the Operation of a Desalting Plant in Israel,
W74-03750 3A

JAPAN

Underground Waste Disposal and Artificial Recharge in Japan,
W74-03226 5E

Aquatic Sediment as a Habitat of Emericellopsis, With a Description of an Undescribed Species of Cephalosporium,
W74-03568 5A

Shore Protection on the Coast of 'Yaizu',
W74-03700 8B

JAPAN (INLAND SEA)

Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

JAPAN (ISHIKARI RIVER)

Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

JAPAN (ISHIKAWA COAST)

A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

JAPAN (LAKE SUWA)

Ecological Studies on Dissolved Oxygen and Bloom of Microcystis in Lake Suwa: I. Horizontal Distribution of Dissolved Oxygen in Relation to Drifting of Microcystis by wind,
W74-03524 5C

JAPAN (OHITA COAST)
Response Characteristics of Underwater Wave Guide,
W74-03677 8B

JAPAN (TOKYO BAY)
Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

JETS
Dispersion in Hydrologic and Coastal Environments,
W74-03327 5B

JUDICIAL DECISIONS
The Substantive Right to Environmental Quality Under the National Environmental Policy Act,
W74-03384 6E

City of Champaign v. Environmental Protection Agency (Administrative Proceeding for Alleged Pollution Against City, University Board of Trustees and Others).
W74-03421 6E

Campaign Clean Water, Inc. v. Ruckelshaus, (Action Brought Against Administrator of Environmental Protection Agency Challenging Impoundment with Respect to Funds Authorized to be Appropriated by Congress).
W74-03424 6E

U.S. v. Reynolds Metals Company (Corporate Immunity for Pollution Under Rivers and Harbors Act of 1899),
W74-03426 6E

U.S. v. Stoeco Homes, Inc. (Permanent Restraining Order Enjoining Developer from Conducting Dredge, Fill and Construction Operations).
W74-03427 6E

Opal Lake Association v. Michaywe'Limited Partnership (Action by Association Composed of Riparian Owners Against Land Development Company for Injunction to Halt Development of Club on Company-Owned Shoreline).
W74-03428 6E

KANSAS
Subsurface Disposal of Waste in Kansas,
W74-03248 5E

Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

KARST
Role of Present-Day Waters in the Karstification of Carbonate Rocks on the Crimean Lowland (Rol' sovremennykh vod v zakarstovanii karbonatnykh porod ravninnogo Kryma),
W74-03258 2K

Some Calculations of the Denudation Rate in a Dolomitic Limestone Area at Isfjord-Radio, West-Spitzbergen,
W74-03514 2J

KARST HYDROLOGY
Role of Present-Day Waters in the Karstification of Carbonate Rocks on the Crimean Lowland (Rol' sovremennykh vod v zakarstovanii karbonatnykh porod ravninnogo Kryma),
W74-03258 2K

Limestone Springs and Individual Flood Events, (With Special Reference to the Gower Peninsula, Wales),
W74-03512 2F

Forced Flow Passages in Karst Massifs,
W74-03513 2J

Some Calculations of the Denudation Rate in a Dolomitic Limestone Area at Isfjord-Radio, West-Spitzbergen,
W74-03514 2J

KELPS
Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

KENTUCKY
Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

A Bill to Provide for the Conversion of Dam Numbered 3 on the Big Sandy River in Kentucky.
W74-03389 6E

Banklick Creek Watershed (Final Environmental Impact Statement).
W74-03398 4D

Reservoirs and Local Government Finance,
W74-03748 6B

KINETICS
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

KLEBSIELLA
Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

LABORATORY EQUIPMENT
A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

LABORATORY TESTS
Biodegradation of Urea in River Waters Under Controlled Laboratory Conditions,
W74-03287 5B

Laboratory Facility for Studies Related to Artificial Recharge,
W74-03360 4B

Grazing of pseudocalanus minutus on Naturally Occuring Particulate Matter,
W74-03593 5B

LAGOONS
Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

LAKE ERIE
Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

LAKE MICHIGAN
Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

Course of Action Under Federal Common Law for Pollution of Interstate Waters,
W74-03382 5G

Spectral Analysis of Shallow Water Waves in Lake Michigan,
W74-03439 2H

LAKE ONTARIO
Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

LAKE RESTORATION
Lake Restoration.
W74-03536 5C

LAKE SAMMAMISH (WASH)
Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

LAKE SEDIMENTS
Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

LAKE SHORES
Camp V. Milam (Action to Force Non-Lake-Front Owner to Remove Boathouse from Lake Shore).
W74-03408 6E

LAKE TAHOE BASIN (CALIF-NEVADA)
Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

LAKE WINGRA (WIS)
Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

LAKES
The Occurrence of Microturbellaria in Some British Lakes of Diverse Chemical Content,
W74-03282 5C

Opal Lake Association v. Michaywe'Limited Partnership (Action by Association Composed of Riparian Owners Against Land Development Company for Injunction to Halt Development of Club on Company-Owned Shoreline).
W74-03428 6E

Biogenic Metamorphosis of Water in Lakes of the Amu-Dar'Ya Delta (O biogennoy metamorfizatsii vody v ozerakh del'ty Amudar'i),
W74-03531 2H

Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

LAND DEVELOPMENT
The River of Grass is Drying Up,
W74-03718 6G

LAND DISPOSAL (WASTE WATER)
Design and Operation of Land Treatment Systems for Minimum Contamination of Groundwater,
W74-03223 5D

LAND FILLS
U.S. V. Joseph G. Moretti, Inc. (Land Fills Deemed 'Structures' Under Rivers and Harbors Act of 1899).
W74-03416 6E

LAND MANAGEMENT
Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

Recycling on the Land: An Alternative for Water Pollution Control,
W74-03387 5D

LAND RECLAMATION
Establishment of Airports on Public Waters and Reclaimed Lands.
W74-03731 6E

LAND SPREADING (WASTE WATER)
Engineering Design Criteria for Spray Irrigation,
W74-03521 5D

LAND SPREADING (WASTEWATER)
Hydrogeologic Considerations in Land Spreading of Sewage Treatment-Plant Effluent in Central Florida,
W74-03518 5D

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

LAND USE
Waterfowl Habitat Trends in the Aspen Parkland of Manitoba,
W74-03517 4C

The Great Miami River Corridor Study: A Concept Plan.
W74-03631 6F

Conservation-Open Space Plan; Amendments to the Springfield Comprehensive Plan.
W74-03634 3D

The Water Resource Management Plan for the AACOG planning Region, Volume II: Urban Water-Related Services.
W74-03643 6B

LANDFILLS
The Nation's Estuaries: San Francisco Bay and Delta, California.
W74-03420 5G

Jefferson National Bank at Sunny Isles v. Metropolitan Dade County (Suit Seeking Declaratory Judgment with Respect to Fill Placed in Bay by Plaintiffs).
W74-03429 6E

LARVAL GROWTH STAGE
Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

Larvae of the Burrowing Shrimp, Upogebia Affinis, (Crustacea, Decapoda, Upogebiidae) from Virginia Plankton,
W74-03303 2L

Mud Shrimp (Callianassa) Larvae (Crustacea, Decapoda, Callianassidae) from Virginia Plankton,
W74-03307 2L

LAW ENFORCEMENT
Municipalities--Lake Authorities.
W74-03734 6E

LAWS
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

LEACHING
Changes in Chemistry of Natural Waters of Cultivated Lands (Izmeneniya khimizma prirodnykh vod kul'turnykh landshaftov),
W74-03257 5B

Virus Removal in Hawaiian Soils,
W74-03293 5F

LEAD NITRATE
Toxicity of Lead Nitrate to Algae,
W74-03595 5C

LEAKAGE
Water Control Apparatus Responsive to Leakage or Overflow Conditions,
W74-03663 4A

LEGAL ASPECTS
Legal Factors in Econometric Modeling of Local Floodplain Management Devices in the Connecticut River Basin,
W74-03207 6F

Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

The Draft United Nations Convention on the International Seabed Area - American Bar Association Position,
W74-03377 6E

Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

California Coastal Zone Conservation Act, Interim Permit Control, General,
W74-03379 6F

Note, Access to Public Municipal Beaches: The Formulation of a Comprehensive Legal Approach,
W74-03380 6E

Environmental Law - Water Pollution Remedies - Use of Public Nuisance Theory in Suit by Federal Government - United States V. Ira S. Bushey and Sons, Inc.,
W74-03381 5G

Course of Action Under Federal Common Law for Pollution of Interstate Waters,
W74-03382 5G

International Environmental Bibliographies, Series I: Legislative and Regulatory Reports.
W74-03383 5G

A Bill to Implement the International Convention on Civil Liability for Oil Pollution Damage and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage.
W74-03395 6E

Water Law of Southeastern Estuaries,
W74-03463 6E

LEGAL LIABILITY
Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

LEGAL REVIEW
Selected Legal and Institutional Aspects of the Texas Coastal Zone.
W74-03630 6E

LEGISLATION
International Environmental Bibliographies, Series I: Legislative and Regulatory Reports.
W74-03383 5G

The Substantive Right to Environmental Quality Under the National Environmental Policy Act,
W74-03384 6E

A Bill to Provide for the Conversion of Dam Numbered 3 on the Big Sandy River in Kentucky.
W74-03389 6E

A Bill to Amend the Fish and Wildlife Coordination Act by Providing for Regulation of Dumping in United States Waters.
W74-03390 6E

A Bill to Establish the French Pete Creek National Woodlands Recreation Area.
W74-03391 6E

A Bill to Amend the Ports and Waterways Safety Act of 1972.
W74-03392 6E

A Bill to Establish a National Flood Plain Policy.
W74-03394 6E

A Bill to Implement the International Convention on Civil Liability for Oil Pollution Damage and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage.
W74-03395 6E

A Bill Authorizing the Construction, Repair, and Preservation of Certain Public Works on Rivers and Harbors for Navigation, Flood Control, and Other Purposes.
W74-03396 6E

An Act to Regulate the Transportation for Dumping, and the Dumping of Material into Ocean Water, and for other Purposes.
W74-03399 6E

Maintenance of Dams, Levees and Flood Control Works.
W74-03401 6E

Wild, Scenic and Recreational Rivers System.
W74-03418 6E

American Falls Dam, Upper Snake River Project, Idaho.
W74-03419 6E

Commonwealth, Marine Resources Commission v. Forbes (Suit by State Alleging Defendants, Without Authority, Had Deposited Fill Upon State Owned Subaqueous Beds of River; Praying for Injunctive Relief).
W74-03423 6E

Harbors and Water-Courses.
W74-03430 6E

Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974, Parts 1 and 2.
W74-03710 6E

Criminal Offenses--Pollution).
W74-03722 6E

Recreational Use of Land and Water Areas--Liability of Owners.
W74-03726 6E

Intertidal Salt Marshes--Penalty.
W74-03727 6E

Establishment of Airports on Public Waters and Reclaimed Lands.
W74-03731 6E

Municipalities--Lake Authorities.
W74-03734 6E

LEPOMIS MACROCHIRUS
Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

LETHAL LIMIT
Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

LEVEES
Maintenance of Dams, Levees and Flood Control Works.
W74-03401 6E

LIABILITY
Recreational Use of Land and Water Areas--Liability of Owners.
W74-03726 6E

LICENSES
Camp V. Milam (Action to Force Non-Lake-Front Owner to Remove Boathouse from Lake Shore).
W74-03408 6E

LIFE CYCLE
Life Cycle of Orchardgrass (Dactylis glomerata L.) in the Flood Meadows of the Oka River: I, (In Russian),
W74-03604 2I

LIFE CYCLES
Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

LIGHT
Effects of Reducing Interplant Competition for Light and Water on Stalk Rot of Corn,
W74-03516 3F

LIMESTONES
Oxygen and Carbon Isotope Compositions of Altered Carbonates from the Western Pacific, Core 53.0, Deep Sea Drilling Project,
W74-03352 2J

LIMITING FACTORS
Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

LIQUID WASTES
Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

Feasibility Study of Liquid-Waste Injection into Aquifers Containing Salt Water, Wilmington, North Carolina,
W74-03362 5E

United States V. Pennsylvania Industrial Chemical Corp. Corporation was Convicted of Discharging Refuse into Navigable Waters in Violation of Rivers and Harbors Act of 1899, and it Appealed).
W74-03407 6E

LITHUANIA (NEMAN RIVER)
New Composite Effluent-Purification Equipment (Novyi kompleks ochistnykh sooruzhenii),
W74-03554 5D

LITTORAL
Features of Horizontal Turbulence in the Littoral Zone of the Ocean,
W74-03452 2E

Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

LITTORAL CURRENTS
Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

LITTORAL DRIFT
A Gross Longshore Transport Rate Formula,
W74-03367 2J

Suspended Sediment and Longshore Sediment Transport Data Review,
W74-03368 2J

Longshore Transport of Suspended Sediment,
W74-03369 2J

The Relationships Between Wind Records, Energy of Longshore Drift, and Energy Balance Off the Coast of a Restricted Body of Water, As Applied to the Baltic,
W74-03431 2J

The Possibility of Calculating the Sand Drift Along a Shallow-Water Coastt. II. Definition of the Basic Concepts and Terms and Formulation of the Problem of Determining the Drift,
W74-03447 2J

Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

Equilibrium Flow Areas of Tidal Inlets on Sandy Coasts,
W74-03695 8B

Suspended Sediment in a Tidal Estuary,
W74-03696 2L

LOCAL GOVERNMENTS
Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

Responsibilities of Local Authorities for Water Pollution Control.
W74-03639 5G

Reservoirs and Local Government Finance,
W74-03748 6B

LONDON
Artificial Recharge in United Kingdom with Special Reference to London Basin,
W74-03225 4B

LONG-TERM PLANNING
The Wyoming Framework Water Plan, A Summary.
W74-03742 6B

LONG WAVES
Long Wave Study of Monterey Bay,
W74-03615 2L

Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

LONGSHORE CURRENTS
Dynamic Characteristics of West Florida Gulf Coast Beaches,
W74-03437 2J

Longshore Currents and Nearshore Topographies,
W74-03627 2E

LOUISIANA
Mortality of Market-Sized Oysters (Crassostrea Virginica) in the Vicinity of a Dredging Operation,
W74-03305 5C

Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

Recent Coastal Sedimentation: Central Louisiana Coast,
W74-03345 2L

LUMBERING
Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

LYOPHILIZED BACTERIA
Production of Bacteriophage by Lyophilized and Oxygen-Exposed Escherichia coli,
W74-03575 5A

MACROINVERTEBRATES
Bottom Macrofauna in the Goczalkowice Dam Reservoir in the Years 1965-1969,
W74-03271 5C

MAGNETIC FLOWMETER
Instrumentation for Water Pollution Monitoring,
W74-03640 5D

MAINE
Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

MANAGEMENT
A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

A Planning Model for A Water Quality Management Agency,
W74-03469 5G

Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility,
W74-03471 3F

The Water Resource Management Plan for the AACOG Planning Region, Volume I: Methodology Analysis of Water Resource Areas.
W74-03642 6B

The Water Resource Management Plan for the AACOG planning Region, Volume II: Urban Water-Related Services.
W74-03643 6B

Socio-Economic Considerations in Water Resources Planning,
W74-03745 6B

MANAGEMENT CONTROL SYSTEM
Investigation of the Public and Private Interests in the Chesapeake Bay Area,
W74-03332 6B

MANGROVE SWAMPS
The Coastal Shoals of Western Cuba and Their Deposits,
W74-03443 2L

Tropical Bay in Danger,
W74-03716 6G

MARGINAL COSTS
Resource Allocation, Information Cost and the Form of Government Intervention,
W74-03485 5G

MARICULTURE
Recycling Wastes for Mariculture,
W74-03714 5G

MARINE ANIMALS
Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

MARINE BACTERIA
Dissociation in a Marine Pseudomonad,
W74-03566 5A

Dissimilatory Reduction of Inorganic Sulfur by Facultatively Anaerobic Marine Bacteria,
W74-03597 5C

MARINE FISH
Dibutyl- and Di- (2-Ethylhexyl)Phthalate in Fish,
W74-03590 5A

MARINE FISHERIES
The Anchovy Crisis,
W74-03473 6C

MARINE FUNGI
Aquatic Sediment as a Habitat of Emericellopsis, With a Description of an Undescribed Species of Cephalosporium,
W74-03568 5A

MARSH GRASSES
Standing Crop of Salt Marshes Surrounding Chincoteague Bay, Maryland-Virginia,
W74-03304 2L

MARSHES
Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

Department of Natural Resources--Divisions.
W74-03728 6E

MARYLAND
Comparative Ecology and Zooplankton of Two Maryland Ponds Including a Congeneric Occurrence of Diaptomus (Calanoida: Copepoda),
W74-03308 5C

Investigation of the Public and Private Interests in the Chesapeake Bay Area,
W74-03332 6B

MASS SPECTROMETRY
A Multiple Specific Ion Detector and Analog Data Processor For a Gas Chromatograph Quadrupole Mass Spectrometer System,
W74-03580 2K

MASS TRANSIT
EPA Pollution Regulations and Fuel Shortage: The Impact on Mass Transit.
W74-03711 5G

MASS TRANSPORT
The Effect of Currents on the Mass Transport of Progressive Water Waves,
W74-03455 2L

MASSACHUSETTS
Effects of Particle Size and Wave State on Grain Dispersion,
W74-03344 2L

Howe V. Di Pierro Manufacturing Co., Inc. (Appeal by Defendants from an Order Enjoining Them from Flooding Plaintiff's Property).
W74-03402 6E

Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

Ontogeny of a Salt Marsh Estuary,
W74-03621 2L

Conservation-Open Space Plan; Amendments to the Springfield Comprehensive Plan.
W74-03634 3D

A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

MATAGORDA BAY (TEX)
Character and Stability of a Natural Tidal Inlet,
W74-03365 2L

MATHEMATICAL MODELS
Mathematical Simulation of Tidal Time-Averages of Salinity and Velocity Profiles in Estuaries,
W74-03348 2L

Water Waves From Underwater Explosions in Shallow Water, Part I: A Mathematical Model for Waves in Constant Depth and in Shoaling Water,
W74-03454 2L

The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

The Salinity Regime and Exchange Characteristics of a Shallow Coastal Bay System,
W74-03611 2L

Mathematical Simulation of Bottom Sediment Motion by Waves,
W74-03698 2J

MEASUREMENT
Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

MEMBRANE PROCESSES
Retention of Dissolved Constituents of Waste by Geologic Membranes,
W74-03238 5B

MERCURY
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

Recent Studies of Mercury Analysis Procedures for Mill Effluents,
W74-03542 5A

Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

Mercury Pollution and Enforcement of the Refuse Act of 1899 (Part 2).
W74-03558 5G

Methylmercury in Estuarine Sediments,
W74-03602 5B

Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

MERSEY ESTUARY (ENGLAND)
Suspended Sediment in a Tidal Estuary,
W74-03696 2L

MESOPHILIC BACTERIA
Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

METABOLIC PATHWAYS
Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

METABOLISM
Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

Glucose and Pyruvate Metabolism of Spirochaeta litoralis, an Anaerobic Marine Spirochete,
W74-03600 5B

METABOLITES
Water Circulation System for Fresh Water Fish Husbandry,
W74-03659 5D

METAL PROCESSING
Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

METALS
Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

Trace-Element Distribution in the Continental-Shelf Sediments off the East Coast of India,
W74-03350 2J

Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

An Investigation of Atomic Absorption Analysis of Mill Effluent Metal Ion Content,
W74-03543 5A

Modified Atomic Absorption Spectroscopic Methods in Analyses of Trace Metals (Modifizierte atomabsorptionsspektroskopische Methoden zur Metallspuren-Analytik),
W74-03586 5A

Method of Separating Metals from Waste Water,
W74-03664 5D

METEOROLOGICAL DATA
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

METEOROLOGY
Preliminary Report on the Hydrography of the Pensacola Bay Estuary, Florida,
W74-03347 2L

METEROLOGICAL DATA
A Multispectral Study of an Extratropical Cyclone with Nimbus 3 Medium Resolution Infrared Radiometer Data,
W74-03349 2B

METHANE
Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

METHANE BACTERIA
Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

METHANOL
The Effect of Discontinuous Methanol Addition on the Growth of a Carbon-Limited Culture of Pseudomonas,
W74-03584 5C

METHODOLOGY
Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

Analyzing the Environmental Impacts of Water Projects.
W74-03472 6G

A Guide to Decision Making for Water Resources Management in the San Antonio Region.
W74-03484 6B

Pollution: Economy and Environment,
W74-03493 6B

Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

METHYL MERCURY
Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

METHYLMERCURY
A Sensitive Bio-Behavioral Assay for Methyl Mercury,
W74-03572 5A

Methylmercury in Estuarine Sediments,
W74-03602 5B

Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

MEXICO
Streptocephalus Moorei N. Sp., a New Fairy Shrimp (Anostraca) From Mexico,
W74-03319 2I

Tabasco Beach-Ridge Plain: An Eroding Coast,
W74-03441 2J

MICHIGAN
Opal Lake Association v. Michaywe'Limited Partnership (Action by Association Composed of Riparian Owners Against Land Development Company for Injunction to Halt Development of Club on Company-Owned Shoreline).
W74-03428 6E

MICROCALORIMETRY
The Microcalorimetry of Microbial Growth,
W74-03273 5A

MICROCYSTIS BLOOM
Ecological Studies on Dissolved Oxygen and Bloom of Microcystis in Lake Suwa: I. Horizontal Distribution of Dissolved Oxygen in Relation to Drifting of Microcystis by wind,
W74-03524 5C

MICROWAVES
A Non-Coherent Model for Microwave Emissions and Backscattering from the Sea Surface,
W74-03510 7B

MIGRATION
Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

MILWAUKEE (WIS)
Floodplain Lands for Parks and Recreation: A Case Study of Milwaukee,
W74-03491 6B

MINE WASTES
Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

MINERAL CONTENT
Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

MINERALIZATION
A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

MINING
Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

MINNESOTA
Metropolitan Development Guide: Protection Open Space--Policy Plan, Program.
W74-03635 6G

MINNOWS
Rearing Bait Fishes in the Rocky Mountain States,
W74-03261 8I

Determine the Present Volume and Value of Bait Fish Sales by Species in Colorado and Adjacent Mountain States,
W74-03262 8I

Distribution and Community Relationships of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03263 8I

Construction of Experimental Bait Fish Culture Ponds,
W74-03264 8I

Growth and Mortality of the Fathead Minnow as Related to Population Density in Production Ponds,
W74-03265 8I

Lake Distribution in Colorado and Community Relationships of the Fathead Minnow in Two Lake Populations,
W74-03266 8I

Selection of the Optimum Brood Fish Density and Sex Ratios of the Fathead Minnow (Pimephales Promelas) under Prescribed Spawning Conditions,
W74-03267 8I

The Life History of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03268 8I

MISSISSIPPI
Proceedings, Mississippi Water Resources Conference, 1973.
W74-03212 5B

Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

MISSISSIPPI

Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

Environmental Aspects of Watershed Planning,
W74-03215 6G

Response of the Lower Mississippi River to Changes in Valley Slope, Sinuosity and Water Temperature,
W74-03216 2E

Multiple Outlet Selective Withdrawal Technique for Water Quality Prediction of Lake Releases,
W74-03218 5B

MISSISSIPPI RIVER
Response of the Lower Mississippi River to Changes in Valley Slope, Sinuosity and Water Temperature,
W74-03216 2E

MIXING
Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism,
W74-03626 5C

MIXOLIMNION
A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

MODEL STUDIES
Mathematical Modeling of Water Quality,
W74-03217 5B

Comparative Analysis of Residential Water Use in Puerto Rico,
W74-03324 6D

Equilibrium Beach Profile Scale-Model Relationship,
W74-03457 2J

The Meteorological Effects on Microwave Apparent Temperatures Looking Downward Over a Smooth Sea,
W74-03511 7B

Models Predict Environment.
W74-03713 2L

MOLECULAR STRUCTURE
Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

MOLLUSKS
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

MONITORING
Feasibility Study of a Seismic Reflection Monitoring System for Underground Waste-Material Injection Sites,
W74-03230 5B

The Microcalorimetry of Microbial Growth,
W74-03273 5A

Recent Studies of Mercury Analysis Procedures for Mill Effluents,
W74-03542 5A

Instrumentation for Water Pollution Monitoring,
W74-03640 5D

MONONGAHELA RIVER
United States V. Pennsylvania Industrial Chemical Corp. Corporation was Convicted of Discharging Refuse into Navigable Waters in Violation of Rivers and Harbors Act of 1899, and it Appealed).
W74-03407 6E

MONTANE STREAMS
Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

MORECAMBE BAY (ENGLAND)
The Effects of Water Conservation Works on the Regime of Morecambe Bay,
W74-03483 4A

MORTALITY
Mortality of Market-Sized Oysters (Crassostrea Virginica) in the Vicinity of a Dredging Operation,
W74-03305 5C

MOSQUITOES
Elimination of Mosquito-Breeding Places.
W74-03730 6E

MUCH SOILS
The River of Grass is Drying Up,
W74-03718 6G

MUD FLATS
The Old Coastline of the Wash,
W74-03435 2L

MUD SHRIMP
Mud Shrimp (Callianassa) Larvae (Crustacea, Decapoda, Callianassidae) from Virginia Plankton,
W74-03307 2L

MUDS
Aquatic Sediment as a Habitat of Emericellopsis, With a Description of an Undescribed Species of Cephalosporium,
W74-03568 5A

MULTI-PURPOSE RESERVOIRS
Reservoirs and Local Government Finance,
W74-03748 6B

MULTIPLE WELL SYSTEMS
Verification of Groundwater Capital Costs,
W74-03338 4B

MUNICIPAL WASTES
Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

Proposed Municipal Waste Water--Groundwater Exchange, City of Tucson: Avra-Marana Valley.
W74-03340 5G

City of Champaign v. Environmental Protection Agency (Administrative Proceeding for Alleged Pollution Against City, University Board of Trustees and Others).
W74-03421 6E

Charles v. Diamond (Extent to Which Police Powers May be Used to Disadvantage Interests in Private Property).
W74-03422 6E

MUNICIPAL WATER
Water Study, Santa Fe Planning Area.
W74-03641 4B

MYCOBACTERIUM LEPRAEMURIUM
Quantitative Extraction of Adenosine Triphosphate From Cultivable and Host-Grown Microbes: Calculation of Adenosine Triphosphate Pools,
W74-03570 5A

MYCOBACTERIUM PHLEI
Quantitative Extraction of Adenosine Triphosphate From Cultivable and Host-Grown Microbes: Calculation of Adenosine Triphosphate Pools,
W74-03570 5A

NATIONAL ENVIRONMENTAL POLICY ACT
The Substantive Right to Environmental Quality Under the National Environmental Policy Act,
W74-03384 6E

People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

NATURAL FLOW DOCTRINE
Howe V. Di Pierro Manufacturing Co., Inc. (Appeal by Defendants from an Order Enjoining Them from Flooding Plaintiff's Property).
W74-03402 6E

NATURAL GAS
Effect of Formation Dip on the Movement of Fresh Water Stored in Saline Aquifers,
W74-03336 4B

NATURAL RESOURCES
Aggregates and Externalities: Information Needs for Public Natural Resource Decision-Making,
W74-03474 6B

NATURAL STREAMS
The Reality of Three British Biotic Indices,
W74-03289 5A

NATURAL WATERS
Biodegradation of Urea in River Waters Under Controlled Laboratory Conditions,
W74-03287 5B

NAVIGABLE RIVERS
United States V. Pennsylvania Industrial Chemical Corp. Corporation was Convicted of Discharging Refuse into Navigable Waters in Violation of Rivers and Harbors Act of 1899, and it Appealed).
W74-03407 6E

Disposal of Old Vessels and Floating Structures.
W74-03729 6G

NAVIGABLE WATERS
A Bill to Amend the Ports and Waterways Safety Act of 1972.
W74-03392 6E

U.S. V. Joseph G. Moretti, Inc. (Land Fills Deemed 'Structures' Under Rivers and Harbors Act of 1899).
W74-03416 6E

U.S. v. Stoeco Homes, Inc. (Permanent Restraining Order Enjoining Developer from Conducting Dredge, Fill and Construction Operations).
W74-03427 6E

Jefferson National Bank at Sunny Isles v. Metropolitan Dade County (Suit Seeking Declaratory Judgment with Respect to Fill Placed in Bay by Plaintiffs).
W74-03429 6E

NAVIGATION
Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974, Parts 1 and 2.
W74-03710 6E

Disposal of Old Vessels and Floating Structures.
W74-03729 6G

NEAR-SHORE CIRCULATION
Near-Shore Circulation in the California Current,
W74-03624 2L

NEARSHORE
The Spectral Structure of Waves in the Nearshore Zone,
W74-03448 2L

NEARSHORE PROCESSES
Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

NETWORK DESIGN
Minimum Cost Design of Water Distribution Systems,
W74-03205 8A

Design of Optimal Precipitation Networks,
W74-03333 2B

NEVADA
User Attitudes Toward Water Quality and Price, Las Vegas Valley and Reno-Sparks, Nevada,
W74-03331 5G

NEW ENGLAND
The Coastal Environment of New England,
W74-03453 2L

NEW JERSEY
Sewerage Districts and Sewerage District Boards.
W74-03411 6E

State Assistance for Local Government.
W74-03412 6E

U.S. v. Stoeco Homes, Inc. (Permanent Restraining Order Enjoining Developer from Conducting Dredge, Fill and Construction Operations).
W74-03427 6E

Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism,
W74-03626 5C

Big Plant Will Treat Waste With Pure Oxygen.
W74-03638 5D

Water Supply and Distribution.
W74-03647 6D

NEW MEXICO
Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

Water Study, Santa Fe Planning Area.
W74-03641 4B

NEW YORK
Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

Wild, Scenic and Recreational Rivers System.
W74-03418 6E

Charles v. Diamond (Extent to Which Police Powers May be Used to Disadvantage Interests in Private Property).
W74-03422 6E

Lake Restoration.
W74-03536 5C

Characteristics of Sedimentary Environments in Moriches Bay,
W74-03707 2L

NEW YORK (GREEN LAKE)
Importance of Diatoms in the Present Varve Deposition (Alternation of Annual Layers) of Green Lake (Near Fayetteville, N.Y.), Model of Confined Sedimentation, (In French),
W74-03577 2H

NEW ZEALAND
Coastal Surface Currents Around New Zealand,
W74-03458 2E

NITRATES
Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

Nitrate and Nitrite in the Surface Waters of Two Delaware Salt Marshes,
W74-03538 5B

Toxicity of Lead Nitrate to Algae,
W74-03595 5C

NITRITES
Nitrate and Nitrite in the Surface Waters of Two Delaware Salt Marshes,
W74-03538 5B

NITROGEN FIXATION
Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

NOMOGRAPHS
Nomographs for Thermal Pollution Control Systems,
W74-03329 5D

NORTH CAROLINA
Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

Role of Bacteria in Decomposition of Injected Liquid Waste at Wilmington, North Carolina,
W74-03246 5B

Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

Feasibility Study of Liquid-Waste Injection into Aquifers Containing Salt Water, Wilmington, North Carolina,
W74-03362 5E

Taylor V. Askew (Proceeding to Condemn a Cartway Over Lands of Respondents to Connect a Tract of Timblerland Owned by Petitioners).
W74-03404 6E

Rucker V. Willis (Class Action Seeking to Enjoin Construction of Proposed Marina and Piers).
W74-03415 6E

Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

Organic Compounds in Soil Water of Some Ultisols of the Atlantic Coastal Plain,
W74-03494 2G

Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

Topographic Changes in the Surf Zone Profile,
W74-03609 2J

Longshore Currents and Nearshore Topographies,
W74-03627 2E

Water and Sewer Study: Part 2 Plans and Programs, Summary Report Buncombe County, North Carolina.
W74-03645 5G

NORWAY
Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

NORWAY (RANA RIVER)
Hydraulic Survey and Model Investigation of the Inner Rana Fjord,
W74-03701 2L

NUCLEAR WASTES
Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

NUCLEATION
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

NUISANCE (LEGAL ASPECTS)
Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

NUTRIENT DEPLETION
Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

NUTRIENT REMOVAL
Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

NUTRIENT REQUIREMENTS
Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

NUTRIENTS
Monitoring Nutrient Losses from Small Watersheds,
W74-03219 5B

Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism,
W74-03626 5C

OAHU
2020 Plan, Board of Water Supply/City and County of Honolulu.
W74-03649 4B

OCEAN CURRENTS
Coastal Surface Currents Around New Zealand,
W74-03458 2E

Near-Shore Circulation in the California Current,
W74-03624 2L

OCEAN WAVES
Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

Conversion System for Providing Useful Energy from Water Surface Motion,
W74-03669 8C

Response Characteristics of Underwater Wave Guide,
W74-03677 8B

OCEANS
Backscattering from a Two-Scale Rough Surface with Application to Radar Sea Return,
W74-03509 7B

A Non-Coherent Model for Microwave Emissions and Backscattering from the Sea Surface,
W74-03510 7B

OECD
Analysis of Costs of Pollution Control.
W74-03486 5G

OFFSHORE PLATFORMS
Treatment of Domestic Sewage at Offshore Locations,
W74-03221 5D

The Economic Impact of a Deepwater Terminal in Texas,
W74-03489 6B

OHIO
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

Hydrodynamics of Mount Simon Sandstone, Ohio and Adjoining Areas,
W74-03235 5B

An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

Recreational Demand at Lakes and Reservoirs,
W74-03480 6D

The Great Miami River Corridor Study: A Concept Plan.
W74-03631 6F

OIL POLLUTION
Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

A Bill to Implement the International Convention on Civil Liability for Oil Pollution Damage and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage.
W74-03395 6E

U.S. v. Reynolds Metals Company (Corporate Immunity for Pollution Under Rivers and Harbors Act of 1899),
W74-03426 6E

Compost for Removing Oil Films from Water,
W74-03658 5D

Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

Installation of Underwater Pollution Apparatus,
W74-03661 5G

Sorbent Belt,
W74-03672 5G

OIL SPILLS
Corporate Immunity From Prosecution under the Federal Water Pollution Control Act.
W74-03376 5G

Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

Containing and Removing Oil Spills on Water,
W74-03670 3A

OIL WASTES
A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

OIL WELLS
Installation of Underwater Pollution Apparatus,
W74-03661 5G

OKLAHOMA
Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

OLIGOCHAETES
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

OLIGOTROPHY
An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

ON-SITE DATA COLLECTIONS
Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

OPEN CHANNEL FLOW
On a Coexistence System of Flow and Waves,
W74-03688 8B

OPEN SPACE
Conservation-Open Space Plan; Amendments to the Springfield Comprehensive Plan.
W74-03634 3D

Metropolitan Development Guide: Protection Open Space--Policy Plan, Program.
W74-03635 6G

OPERATING COSTS
Verification of Groundwater Capital Costs,
W74-03338 4B

OPERATIONS RESEARCH
Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility,
W74-03471 3F

OPTIMIZATION
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

Minimum Cost Design of Water Distribution Systems,
W74-03205 8A

Design of Optimal Precipitation Networks,
W74-03333 2B

Optimizing Water Use: The Return Flow Issue,
W74-03385 6E

The Optimal Time to Start the Operation of a Desalting Plant in Israel,
W74-03750 3A

ORCHARD GRASS
Life Cycle of Orchardgrass (Dactylis glomerata L.) in the Flood Meadows of the Oka River: I, (In Russian),
W74-03604 2I

OREGON
A Bill to Establish the French Pete Creek National Woodlands Recreation Area.
W74-03391 6E

A Model Study of the Entrance Channel Depoe Bay, Oregon,
W74-03614 8B

Predicted Flushing Times and Pollution Distribution in the Columbia River Estuary,
W74-03704 5B

ORGANIC ACIDS
Comparison of Field and Sigma-Inductive Models for the Transmission of Nonconjugative Substituent Effects. The 2,6-Spiro (3,3) Heptyl System,
W74-03737 2K

ORGANIC CARBON (HYDROLYZABLE)
Readily Hydrosable Organic Matter in Bottom Sediments of Lake Baikal, (In Russian),
W74-03715 5C

ORGANIC COMPOUNDS
Organic Compounds in Soil Water of Some Ultisols of the Atlantic Coastal Plain,
W74-03494 2G

Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

Determination of Trace Organics in Air and Water,
W74-03576 5A

Photochemistry of Bioactive Compounds. Kinetics of Selected s-Triazines in Solution,
W74-03582 5A

ORGANIC MATTER
Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

Distribution Patterns of Organic Matter in River Waters of the Wooded Tundra Zone (Zakonomernosti raspredeleniya organicheskogo veshchestva rechnykh vod lesotundrovoy zony),
W74-03255 2K

Formation of the Annual Ring and the Accumulation of Organic Matter in Trees, (In Russian).
W74-03466 2I

Distribution and Characteristics of Organic Matter in River Waters of the Tundra Zone (Raspredeleniye i osobennosti organicheskikh veshchestv rechnykh vod tundrovoy zony),
W74-03534 2K

Method and Apparatus for Purifying Sea Water,
W74-03654 3A

Readily Hydrosable Organic Matter in Bottom Sediments of Lake Baikal, (In Russian),
W74-03715 5C

ORGANIC SOLVENTS
Effects of Pesticides on Euglena gracilis. I. Growth Studies,
W74-03571 5C

ORGANIC WASTES
Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

ORGANIZATIONS
International Environmental Bibliographies, Series I: Legislative and Regulatory Reports.
W74-03383 5G

ORGANOMERCURY
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

OSCILLATION
On a Coexistence System of Flow and Waves,
W74-03688 8B

OSCILLATORY FLOW
Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

OSCILLATORY WAVES
Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

OUTER CONTINENTAL SHELF
The Draft United Nations Convention on the International Seabed Area - American Bar Association Position,
W74-03377 6E

OUTLETS
Dispersion in Hydrologic and Coastal Environments,
W74-03327 5B

OVERFLOW
A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

Water Control Apparatus Responsive to Leakage or Overflow Conditions,
W74-03663 4A

OVERGROWTH
The Formation of Phytocenoses on the Liberated Ground of Lake Sevan, (In Russian),
W74-03632 2H

OVERWINTERING SITES
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

OXIDATION
Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

Sewage Treatment Apparatus and Method,
W74-03656 5D

Phosphorous Removal from Wastewater,
W74-03667 5D

OXYGEN
Production of Bacteriophage by Lyophilized and Oxygen-Exposed Escherichia coli,
W74-03575 5A

Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

Stagnant Sea,
W74-03712 5C

OXYGENATION
Lake Restoration.
W74-03536 5C

Big Plant Will Treat Waste With Pure Oxygen.
W74-03638 5D

OYSTERS
Recycling Wastes for Mariculture,
W74-03714 5G

PACIFIC OCEAN
An Instrumentation System to Measure Near-Bottom Conditions on the Continental Shelf,
W74-03353 2J

People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

Regressions Between Biological Oceanographic Measurements in the Eastern Tropical Pacific and Their Significance to Ecological Efficiency,
W74-03559 5B

A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

PAINTS
Method for Purifying Water,
W74-03652 5D

PARABIOTIC GROWTH APPARATUS
Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

PARKS
The Great Miami River Corridor Study: A Concept Plan.
W74-03631 6F

PARTICLE SIZE
Effects of Particle Size and Wave State on Grain Dispersion,
W74-03344 2L

PARTICULATE MATTER
Grazing of pseudocalanus minutus on Naturally Occuring Particulate Matter,
W74-03593 5B

PATENTS
Iodine Treated Activated Carbon and Process of Treating Contaminated Water Therewith,
W74-03651 5D

Method for Purifying Water,
W74-03652 5D

Control of Aquatic Plant Life,
W74-03653 4A

Method and Apparatus for Purifying Sea Water,
W74-03654 3A

System for Purification of Polluted Water,
W74-03655 5D

Sewage Treatment Apparatus and Method,
W74-03656 5D

Sewage Treatment Process,
W74-03657 5D

Compost for Removing Oil Films from Water,
W74-03658 5D

Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

PATENTS

Installation of Underwater Pollution Apparatus,
W74-03661 5G

Filtration System for Liquids,
W74-03662 5F

Water Control Apparatus Responsive to Leakage or Overflow Conditions,
W74-03663 4A

Method of Separating Metals from Waste Water,
W74-03664 5D

Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

Circuit for Water Depth Meter,
W74-03666 7B

Phosphorous Removal from Wastewater,
W74-03667 5D

Hyperbolic Cross Flow Cooling Tower with Basins and Fill Integrated into Shell,
W74-03668 5D

Conversion System for Providing Useful Energy from Water Surface Motion,
W74-03669 8C

Containing and Removing Oil Spills on Water,
W74-03670 3A

Method of Digesting and Further Processing Fresh Sewage Sludge or Sapropel,
W74-03671 5D

Sorbent Belt,
W74-03672 5G

PATH OF POLLUTANTS

Effects of Waste Percolation of Groundwater in Alluvium Near Barstow, California,
W74-03228 5E

Radioactive- and Chemical-Waste Transport in Groundwater at National Reactor Testing Station, Idaho: 20-Year Case History and Digital Model,
W74-03233 5B

Hydrodynamics of Mount Simon Sandstone, Ohio and Adjoining Areas,
W74-03235 5B

Retention of Dissolved Constituents of Waste by Geologic Membranes,
W74-03238 5B

Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

Virus Removal in Hawaiian Soils,
W74-03293 5F

Dispersion in Hydrologic and Coastal Environments,
W74-03327 5B

Predicted Flushing Times and Pollution Distribution in the Columbia River Estuary,
W74-03704 5B

Preliminary Results and Comparison of Dye Tracer Studies Conducted in Harbors, Estuaries, and Coastal Waters,
W74-03705 5B

PATHOGENIC BACTERIA

Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

PATHS OF POLLUTANTS

Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

PENALTIES (LEGAL)

Criminal Offenses--Pollution).
W74-03722 6E

PENNSYLVANIA

United States V. Pennsylvania Industrial Chemical Corp. Corporation was Convicted of Discharging Refuse into Navigable Waters in Violation of Rivers and Harbors Act of 1899, and it Appealed).
W74-03407 6E

Central Bucks Joint School Building Authority V. Rawls (Action by Landowner to Recover Compensation for Alleged De Facto Taking of Property).
W74-03409 6G

Master Plan for Water Supply, Bucks County, Pennsylvania, 1970.
W74-03629 3D

Comprehensive Water Systems Needs Plan, 1970-2000, Allegheny County, Pennsylvania.
W74-03650 3D

PERCOLATING WATER

Virus Removal in Hawaiian Soils,
W74-03293 5F

PERIDINIUM WISCONSINENSE

Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

PERIODIC WAVES

Runup Recipe for Periodic Waves on Uniformly Sloping Beaches,
W74-03686 8B

PERIPHYTON

Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

The Chironomids of the Periphyton in the Yugoslav Part of the River Danube (Die Chironomidenfauna aus dem Periphyton in der jugoslawischen Donaustrecke),
W74-03562 5A

PERMEABILITY

Laboratory Facility for Studies Related to Artificial Recharge,
W74-03360 4B

PERMIT

Disposal of Old Vessels and Floating Structures.
W74-03729 6G

PERMITS

California Coastal Zone Conservation Act, Interim Permit Control, General,
W74-03379 6F

Water Pollution Control Handbook--A Citizens Guide to the Federal Water Pollution Control Act Amendments of 1972--Volume II,
W74-03388 5G

United States V. Pennsylvania Industrial Chemical Corp. Corporation was Convicted of Discharging Refuse into Navigable Waters in Violation of Rivers and Harbors Act of 1899, and it Appealed).
W74-03407 6E

Water Power.
W74-03413 6E

U.S. v. Stoeco Homes, Inc. (Permanent Restraining Order Enjoining Developer from Conducting Dredge, Fill and Construction Operations).
W74-03427 6E

PERU

The Anchovy Crisis,
W74-03473 6C

PESTICIDE KINETICS

Photochemistry of Bioactive Compounds. Kinetics of Selected s-Triazines in Solution,
W74-03582 5A

PESTICIDE TOXICITY

Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

Effects of Pesticides on Euglena gracilis. I. Growth Studies,
W74-03571 5C

PESTICIDES

Determination of Trichlorfon (0,0-Dimethyl (2,2,2-Trichloro-1-Hydroxyethyl)Phosphonate) in Forest Environmental Samples,
W74-03588 5A

PETALONIA FASCIA

The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

PETROLEUM REFINERIES

Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

PHAEOPHYTA

Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

PHENOLS

Thermodynamics of Acid-Base Equilibria. m' and p' Hydroxybenzaldehyde,
W74-03738 2K

PHOENIX (ARIZ)

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

PHOSPHATE REMOVAL
Removal of Phosphate from Waste Water by Aluminum and Iron, Phase III,
W74-03208 5D

PHOSPHATES
Effect of Phosphate and Chloride Salts on Ammonification in Waterlogged Soils,
W74-03445 2G

Is Phosphate Reduced to Phosphine in Waterlogged Soils,
W74-03523 2G

Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

PHOSPHINE
Is Phosphate Reduced to Phosphine in Waterlogged Soils,
W74-03523 2G

PHOSPHOROUS
Phosphorous Removal from Wastewater,
W74-03667 5D

PHOSPHORUS
Potential of an Eroding Urban Soil for the Phosphorus Enrichment of Streams: I. Evaluation of Methods,
W74-03438 5B

PHOTODECOMPOSITION
Photodecomposition of P-Chlorophenoxyacetic Acid,
W74-03583 5B

Photodecomposition of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) in Water,
W74-03585 5B

PHOTOGRAPHY
Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

PHOTOLYSIS
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

PHOTOPLANKTON
A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

PHOTOSYNTHESIS
Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

PHYSICAL PROPERTIES
Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

PHYSICOCHEMICAL PROPERTIES
Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

PHYSIOLOGICAL ECOLOGY
Physiological Aspects of Animal Life in Estuaries with Special Reference to Salinity,
W74-03461 2L

PHYTOCENOSES
The Formation of Phytocenoses on the Liberated Ground of Lake Sevan, (In Russian),
W74-03632 2H

PHYTOPLANKTON
Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

Dynamics of Phytoplankton in the Lower Volga and the Main Channels of its Delta, (In Russian),
W74-03646 5C

PIERS
Wave Runup on Vertical Cylinders,
W74-03372 8B

PINE TREES
Immediate Resumption of Growth by Radiata Pine After Five Months of Minimal Transpiration During Drought,
W74-03519 2D

PIPING SYSTEMS (MECHANICAL)
Minimum Cost Design of Water Distribution Systems,
W74-03205 8A

PIT RECHARGE
Movement and Accumulation of Suspended Sediment During Basin Recharge,
W74-03240 4B

PLANKTON
Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

PLANNING
A Planning Model for A Water Quality Management Agency,
W74-03469 5G

Aggregates and Externalities: Information Needs for Public Natural Resource Decision-Making,
W74-03474 6B

Master Plan for Water Supply, Bucks County, Pennsylvania, 1970.
W74-03629 3D

The Great Miami River Corridor Study: A Concept Plan.
W74-03631 6F

Natural Features Element of the Comprehensive Plan: A Plan for Action.
W74-03633 4C

The Water Resource Management Plan for the AACOG Planning Region, Volume I: Methodology Analysis of Water Resource Areas.
W74-03642 6B

The Water Resource Management Plan for the AACOG planning Region, Volume II: Urban Water-Related Services.
W74-03643 6B

Water and Sewer Study: Part 2 Plans and Programs, Summary Report Buncombe County, North Carolina.
W74-03645 5G

Water Supply and Distribution.
W74-03647 6D

The Wyoming Framework Water Plan, A Summary.
W74-03742 6B

Socio-Economic Considerations in Water Resources Planning,
W74-03745 6B

PLANT GROWTH
The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

PLANT MORPHOLOGY
The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

PLANTS (WATER)
Effects of Reducing Interplant Competition for Light and Water on Stalk Rot of Corn,
W74-03516 3F

POLAND
Bottom Macrofauna in the Goczalkowice Dam Reservoir in the Years 1965-1969,
W74-03271 5C

Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

POLITICAL ASPECTS
Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

The Resolution of Uncertainty,
W74-03479 5G

POLLUTANT IDENTIFICATION
Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

POLLUTANT IDENTIFICATION

Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

Recent Studies of Mercury Analysis Procedures for Mill Effluents,
W74-03542 5A

An Investigation of Atomic Absorption Analysis of Mill Effluent Metal Ion Content,
W74-03543 5A

Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

Direct Fluorescent-Antibody Technique for the Microbiological Examination of Food and Environmental Swab Samples for Salmonellae,
W74-03569 5A

Determination of Trace Organics in Air and Water,
W74-03576 5A

A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

Photochemistry of Bioactive Compounds. Kinetics of Selected s-Triazines in Solution,
W74-03582 5A

Photodecomposition of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) in Water,
W74-03585 5B

Characterization and Microdetermination of a Water-Soluble Metabolite from Bladex Herbicide by Conversion to 5,5-Dimethylhydantion,
W74-03587 5A

Determination of Trichlorfon (0,0-Dimethyl (2,2,2-Trichloro-1-Hydroxyethyl)Phosphonate) in Forest Environmental Samples,
W74-03588 5A

Element Specific Gas Chromatographic Analyses of Organochlorine Pesticides in the Presence of PCB's by Selective Cancellation of Interfering Peaks,
W74-03589 5A

Dibutyl- and Di- (2-Ethylhexyl)Phthalate in Fish,
W74-03590 5A

POLLUTANTS

Preliminary Results and Comparison of Dye Tracer Studies Conducted in Harbors, Estuaries, and Coastal Waters,
W74-03705 5B

POLLUTED ENVIRONMENT

Study of a Polluted Environment (The Old Port Area of Marseilles): The Influence of Physical and Chemical Conditions on the Characteristics of the Population of the Quay, (In French),
W74-03719 5C

POLLUTION ABATEMENT

Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

Toward Environmental Sanity,
W74-03346 5G

Environmental Law - Water Pollution Remedies - Use of Public Nuisance Theory in Suit by Federal Government - United States V. Ira S. Bushey and Sons, Inc.,
W74-03381 5G

Course of Action Under Federal Common Law for Pollution of Interstate Waters,
W74-03382 5G

City of Champaign v. Environmental Protection Agency (Administrative Proceeding for Alleged Pollution Against City, University Board of Trustees and Others).
W74-03421 6E

U.S. v. Reynolds Metals Company (Corporate Immunity for Pollution Under Rivers and Harbors Act of 1899),
W74-03426 6E

Resource Allocation, Information Cost and the Form of Government Intervention,
W74-03485 5G

Analysis of Costs of Pollution Control.
W74-03486 5G

The Pollution Content of American Trade,
W74-03490 5G

Economic Growth and Environmental Decay: The Solution Becomes the Problem,
W74-03492 6B

In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

Forest Industry's Environmental Pollution Control in Finland. The Finnish Forest Industry's Water Protection Investment Programme.
W74-03546 5D

Cleanup of Polluted Rhine River Will Cost Western Europe Billions.
W74-03637 5G

Compost for Removing Oil Films from Water,
W74-03658 5D

Installation of Underwater Pollution Apparatus,
W74-03661 5G

Containing and Removing Oil Spills on Water,
W74-03670 3A

Sorbent Belt,
W74-03672 5G

Some Technical and Economic Concerns Relating to Shipboard Pollution Abatement,
W74-03743 5D

Pollution Control and the Behavior of the Firm--A Technical Note,
W74-03749 5G

POLLUTION TAXES (CHARGES)

Pollution Control and the Behavior of the Firm--A Technical Note,
W74-03749 5G

POLYMERS

Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

PONDS

Comparative Ecology and Zooplankton of Two Maryland Ponds Including a Congeneric Occurrence of Diaptomus (Calanoida: Copepoda),
W74-03308 5C

Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

POPULATION

The Occurrence of Microturbellaria in Some British Lakes of Diverse Chemical Content,
W74-03282 5C

POPULATION DENSITY

Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

POROUS MEDIA

Laboratory Facility for Studies Related to Artificial Recharge,
W74-03360 4B

POTABLE WATER

Determination of Trace Organics in Air and Water,
W74-03576 5A

POTASSIUM

Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

POTHOLES

Waterfowl Habitat Trends in the Aspen Parkland of Manitoba,
W74-03517 4C

POTOMAC RIVER

Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam, and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

POULTRY

Pretreatment of Poultry Processing Wastes: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03497 5D

In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

POULTRY PROCESSING PLANTS

In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

POULTRY WASTE PRETREATMENT

Pretreatment of Poultry Processing Wastes: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03497 5D

POWER OPERATION AND MAINTENANCE
Power Input for the Surface Aerator in Waste Water Treatment Plants (Prikon povrchoveho aeracniho michadla pro cisteni odpadnich vod),
W74-03555 5D

POWERPLANTS
A Bill to Amend the Ports and Waterways Safety Act of 1972.
W74-03392 6E

PRE-IMPOUNDMENT
Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

PRECIPITATION (ATMOSPHERIC)
Some Data on Fluorine, Bromine, and Iodine Concentrations in Atmospheric Precipitation at Voronezh (Nekotoryye dannyye o soderzhanii ftora, broma i ioda v atmosfernykh osadkakh g. Voronezha),
W74-03251 5A

Investigation of the Chemical Composition of Atmospheric Precipitation in the Vicinity of Yevpatoriya (Issledovaniye khimicheskogo sostava atmosfernykh osadkov v rayone g. Yevpatorii),
W74-03526 2K

PRECIPITATION NETWORK
Design of Optimal Precipitation Networks,
W74-03333 2B

PRIMARY PRODUCTIVITY
An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

Regressions Between Biological Oceanographic Measurements in the Eastern Tropical Pacific and Their Significance to Ecological Efficiency,
W74-03559 5B

PRIOR APPROPRIATION
Optimizing Water Use: The Return Flow Issue,
W74-03385 6E

PRODUCTIVITY
The Influences of an Urban Area and a Reservoir on Benthic Macroinvertebrate Production in the Des Moines River, Iowa,
W74-03209 5C

PROFILES
Equilibrium Beach Profile Scale-Model Relationship,
W74-03457 2J

PROGRESSIVE GRAVITY WAVES
The Effect of Currents on the Mass Transport of Progressive Water Waves,
W74-03455 2L

PROJECT PLANNING
Recreational Demand at Lakes and Reservoirs,
W74-03480 6D

Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

The Water Resource Management Plan for the AACOG Planning Region, Volume III: Short Range Program 1970-1975.
W74-03644 6B

PROJECTIONS
2020 Plan, Board of Water Supply/City and County of Honolulu.
W74-03649 4B

Comprehensive Water Systems Needs Plan, 1970-2000, Allegheny County, Pennsylvania.
W74-03650 3D

The Wyoming Framework Water Plan, A Summary.
W74-03742 6B

PROJECTS
Environmental Aspects of Watershed Planning,
W74-03215 6G

PROPERTY VALUES
Central Bucks Joint School Building Authority V. Rawls (Action by Landowner to Recover Compensation for Alleged De Facto Taking of Property).
W74-03409 6G

PROTOZOA
Sterile Culture Techniques for Species of the Rotifer Asplanchna,
W74-03316 5A

PSEUDOCALANUS MINUTUS
Grazing of pseudocalanus minutus on Naturally Occuring Particulate Matter,
W74-03593 5B

PSEUDOMONADS
Dissociation in a Marine Pseudomonad,
W74-03566 5A

PSEUDOMONAS
The Effect of Discontinuous Methanol Addition on the Growth of a Carbon-Limited Culture of Pseudomonas,
W74-03584 5C

PSEUDOMONAS IODOOXIDANS
Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

PUBLIC ACCESS
Note, Access to Public Municipal Beaches: The Formulation of a Comprehensive Legal Approach,
W74-03380 6E

Recreational Use of Land and Water Areas--Liability of Owners.
W74-03726 6E

PUBLIC HEALTH
Kings County Economic Community Development Association V. Hardin (Payment of Farm Subsidies Do Not Require Nepa Approval).
W74-03417 6E

Elimination of Mosquito-Breeding Places.
W74-03730 6E

PUBLIC HEARING
North Coastal Area Investigation. South Fork EEL River Study: A Summary of the Public Hearing Comments on the Preliminary Edition Dated January 1968, Final Supplement,
W74-03476 6B

PUBLIC LANDS
Finish Allatoona's Interstate Right, Inc. V. Volpe (Suit to Enjoin Construction of Last Segment of Highway 1-75 Across Portion of Publicly Owned Lake).
W74-03405 6E

PUBLIC PARTICIPATION
Socio-Economic Considerations in Water Resources Planning,
W74-03745 6B

PUBLIC UTILITIES
City of Midway V. Midway Nursing and Convalescent Center, Inc. (Suit by City to Enjoin Church from Furnishing Water to Nursing Home and Enjoin Nursing Home from Receiving Water from Other Defendants in Competition with City).
W74-03403 6E

PUBLICATIONS
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

PUERTO RICO
Comparative Analysis of Residential Water Use in Puerto Rico,
W74-03324 6D

Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

PULP AND PAPER INDUSTRY
Forest Industry's Environmental Pollution Control in Finland. The Finnish Forest Industry's Water Protection Investment Programme.
W74-03546 5D

PULP WASTES
Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

Recent Studies of Mercury Analysis Procedures for Mill Effluents,
W74-03542 5A

An Investigation of Atomic Absorption Analysis of Mill Effluent Metal Ion Content,
W74-03543 5A

Effect of Bark Addition on the Dewatering Properties of Biological Sludges.
W74-03544 5D

Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

Conventional Treatment Methods for Pulp and Paper Mill Wastes and Disposal on Land for Irrigation,
W74-03547 5D

Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

New Composite Effluent-Purification Equipment (Novyi kompleks ochistnykh sooruzhenii),
W74-03554 5D

pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

Review of Rapid BOD Test Methods,
W74-03557 5A

PYRUVATES
Glucose and Pyruvate Metabolism of Spirochaeta litoralis, an Anaerobic Marine Spirochete,
W74-03600 5B

QUALITY CONTROL
Two-Level Skip-Lot Sampling Plans - Operating Characteristic Properties,
W74-03291 7C

QUASILINEARIZATION
Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

QUAY
Study of a Polluted Environment (The Old Port Area of Marseilles): The Influence of Physical and Chemical Conditions on the Characteristics of the Population of the Quay, (In French),
W74-03719 5C

RADAR
Backscattering from a Two-Scale Rough Surface with Application to Radar Sea Return,
W74-03509 7B

RADIOACTIVE WASTE DISPOSAL
Geohydrology of Buried Triassic Basin at Savannah River Plant, South Carolina,
W74-03241 5E

Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

RADIOACTIVE WASTES
Radioactive- and Chemical-Waste Transport in Groundwater at National Reactor Testing Station, Idaho: 20-Year Case History and Digital Model,
W74-03233 5B

Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

RADIOACTIVITY TECHNIQUES
Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

RADIOISOTOPES
Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

RARITAN BAY (NJ)
The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism,
W74-03626 5C

REAERATION
Lake Restoration.
W74-03536 5C

REASONABLE USE
Opal Lake Association v. Michaywe'Limited Partnership (Action by Association Composed of Riparian Owners Against Land Development Company for Injunction to Halt Development of Club on Company-Owned Shoreline).
W74-03428 6E

RECHARGE PONDS
Water Circulation System for Fresh Water Fish Husbandry,
W74-03659 5D

RECLAIMED WATER
Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

Dan Region, Israel, Sewage-Reclamation and Recharge Project,
W74-03359 5D

RECREATION
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

Wild, Scenic and Recreational Rivers System.
W74-03418 6E

Floodplain Lands for Parks and Recreation: A Case Study of Milwaukee,
W74-03491 6B

The Great Miami River Corridor Study: A Concept Plan.
W74-03631 6F

Recreational Use of Land and Water Areas--Liability of Owners.
W74-03726 6E

RECREATION DEMAND
Recreational Demand at Lakes and Reservoirs,
W74-03480 6D

Castaic Lake Area Recreation Development Plan,
W74-03481 6B

RECREATION FACILITIES
A Bill to Establish the French Pete Creek National Woodlands Recreation Area.
W74-03391 6E

RECYCLING
Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

Sewage Treatment Process,
W74-03657 5D

Recycling Wastes for Mariculture,
W74-03714 5G

REDUCTION (CHEMICAL)
Biogenic Metamorphosis of Water in Lakes of the Amu-Dar'Ya Delta (O biogennoy metamorfizatsii vody v ozerakh del'ty Amudar'i),
W74-03531 2H

Dissimilatory Reduction of Inorganic Sulfur by Facultatively Anaerobic Marine Bacteria,
W74-03597 5C

REFRACTION (WATER WAVES)
Numerical Calculation of Wave Refraction Digital Computer,
W74-03343 8B

REFUSE ACT OF 1899
Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

Mercury Pollution and Enforcement of the Refuse Act of 1899 (Part 2).
W74-03558 5G

REGIONAL DEVELOPMENT
The Water Resource Management Plan for the AACOG Planning Region, Volume I: Methodology Analysis of Water Resource Areas.
W74-03642 6B

REGRESSION ANALYSIS
Regressions Between Biological Oceanographic Measurements in the Eastern Tropical Pacific and Their Significance to Ecological Efficiency,
W74-03559 5B

REGULATION
Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

International Environmental Bibliographies, Series I: Legislative and Regulatory Reports.
W74-03383 5G

Resource Allocation, Information Cost and the Form of Government Intervention,
W74-03485 5G

REMEDIES
Opal Lake Association v. Michaywe'Limited Partnership (Action by Association Composed of Riparian Owners Against Land Development Company for Injunction to Halt Development of Club on Company-Owned Shoreline).
W74-03428 6E

REMOTE SENSING
A Multispectral Study of an Extratropical Cyclone with Nimbus 3 Medium Resolution Infrared Radiometer Data,
W74-03349 2B

Remote Sensing in the Study of Coastal Processes,
W74-03373 7B

Coastal Applications of the ERTS-A Satellite,
W74-03374 2J

Backscattering from a Two-Scale Rough Surface with Application to Radar Sea Return,
W74-03509 7B

A Non-Coherent Model for Microwave Emissions and Backscattering from the Sea Surface,
W74-03510 7B

RENT ALLOTMENT
A Planning Model for A Water Quality Management Agency,
W74-03469 5G

RESERVOIR CONSTRUCTION
Reservoirs and Local Government Finance,
W74-03748 6B

RESERVOIR RELEASES
Multiple Outlet Selective Withdrawal Technique for Water Quality Prediction of Lake Releases,
W74-03218 5B

RESERVOIRS
Species Diversity of Benthic Macroinvertebrates in the Des Moines River, Iowa,
W74-03211 5C

Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

Bottom Macrofauna in the Goczalkowice Dam Reservoir in the Years 1965-1969,
W74-03271 5C

Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

Dams and Reservoirs in Texas: Part II,
W74-03375 8A

Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

Ion Load and Carbonate Equilibrium in the Troitsk Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

RESIDENTIAL WATER DEMAND
The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

RESONANCE
Tidal Resonance in the Bay of Fundy and Gulf of Maine,
W74-03434 2L

Pilot Model Study for the Design of Hilo Harbor Tsunami Model. Hydraulic Model Investigation,
W74-03613 8B

RESOURCES ALLOCATION
Resource Allocation, Information Cost and the Form of Government Intervention,
W74-03485 5G

RETURN FLOW
Optimizing Water Use: The Return Flow Issue,
W74-03385 6E

REVIEWS
Artificial Recharge--State of the Art,
W74-03354 4B

Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

Review of Rapid BOD Test Methods,
W74-03557 5A

RHINE RIVER
Cleanup of Polluted Rhine River Will Cost Western Europe Billions.
W74-03637 5G

RHODANINE COMPOUNDS
Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

RHODE ISLAND
Department of Natural Resources--Divisions.
W74-03728 6E

RIGHT-OF-WAY
Harbors and Water-Courses.
W74-03430 6E

RIPARIAN LAND
Commonwealth, Marine Resources Commission v. Forbes (Suit by State Alleging Defendants, Without Authority, Had Deposited Fill Upon State Owned Subaqueous Beds of River; Praying for Injunctive Relief).
W74-03423 6E

RIPARIAN PLANTS
Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

RIPARIAN RIGHTS
Howe V. Di Pierro Manufacturing Co., Inc. (Appeal by Defendants from an Order Enjoining Them from Flooding Plaintiff's Property).
W74-03402 6E

Commonwealth, Marine Resources Commission v. Forbes (Suit by State Alleging Defendants, Without Authority, Had Deposited Fill Upon State Owned Subaqueous Beds of River; Praying for Injunctive Relief).
W74-03423 6E

Opal Lake Association v. Michaywe'Limited Partnership (Action by Association Composed of Riparian Owners Against Land Development Company for Injunction to Halt Development of Club on Company-Owned Shoreline).
W74-03428 6E

Jefferson National Bank at Sunny Isles v. Metropolitan Dade County (Suit Seeking Declaratory Judgment with Respect to Fill Placed in Bay by Plaintiffs).
W74-03429 6E

RIPARIAN WATERS
Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

RIPPLE MARKS
Falling Water Level Ripple Marks,
W74-03449 2L

RISKS
The Resolution of Uncertainty,
W74-03479 5G

RIVER BASIN COMMISSIONS
Ohio River Valley Water Sanitation Commission.
W74-03736 6E

RIVER BASINS
A Planning Model for A Water Quality Management Agency,
W74-03469 5G

The Water Resource Management Plan for the AACOG Planning Region, Volume I: Methodology Analysis of Water Resource Areas.
W74-03642 6B

RIVER BASINS COMMISSIONS
Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam, and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

RIVER FLOW
Mathematical Simulation of Tidal Time-Averages of Salinity and Velocity Profiles in Estuaries,
W74-03348 2L

RIVERS
A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

Distribution Patterns of Organic Matter in River Waters of the Wooded Tundra Zone (Zakonomernosti raspredeleniya organicheskogo veshchestva rechnykh vod lesotundrovoy zony),
W74-03255 2K

Investigation of Runoff of Kamchatka Rivers Based on Climatic Data (Issledovaniye stoka rek Kamachatki po klimaticheskim dannym),
W74-03259 2E

Distribution and Characteristics of Organic Matter in River Waters of the Tundra Zone (Raspredeleniye i osobennosti organicheskikh veshchestv rechnykh vod tundrovoy zony),
W74-03534 2K

Disposal of Old Vessels and Floating Structures.
W74-03729 6G

RIVERS AND HARBORS ACT
Corporate Immunity From Prosecution under the Federal Water Pollution Control Act.
W74-03376 5G

United States V. Pennsylvania Industrial Chemical Corp. Corporation was Convicted of Discharging Refuse into Navigable Waters in

Violation of Rivers and Harbors Act of 1899, and it Appealed).
W74-03407 6E

U.S. V. Joseph G. Moretti, Inc. (Land Fills Deemed 'Structures' Under Rivers and Harbors Act of 1899).
W74-03416 6E

U.S. v. Reynolds Metals Company (Corporate Immunity for Pollution Under Rivers and Harbors Act of 1899),
W74-03426 6E

ROAD CONSTRUCTION
Bridge Construction and Maintenance over or Adjacent to Streams.
W74-03724 6E

ROCK GREENLING
The Feeding Ecology of the Rock Greenling, Hexagrammos lagocephalus, in the Inshore Waters of Amchitka Island, Alaska,
W74-03505 2I

ROTIFERS
A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

Sterile Culture Techniques for Species of the Rotifer Asplanchna,
W74-03316 5A

RUNOFF
Investigation of Runoff of Kamchatka Rivers Based on Climatic Data (Issledovaniye stoka rek Kamachatki po klimaticheskim dannym),
W74-03259 2E

SALINE AQUIFERS
Saline Aquifers--Future Storage Reservoirs for Fresh Water,
W74-03224 5E

Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

Effect of Formation Dip on the Movement of Fresh Water Stored in Saline Aquifers,
W74-03336 4B

SALINE INTRUSION
Mathematical Simulation of Tidal Time-Averages of Salinity and Velocity Profiles in Estuaries,
W74-03348 2L

SALINE WATER BARRIERS
Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

SALINE WATER - FRESHWATER INTERFACES
Salinity Distribution and Effect of Fresh Water Flows in the Hooghly River,
W74-03702 2L

SALINE WATER INTRUSION
Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

Salinity Distribution and Effect of Fresh Water Flows in the Hooghly River,
W74-03702 2L

Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

SALINITY
Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

Physiological Aspects of Animal Life in Estuaries with Special Reference to Salinity,
W74-03461 2L

Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

The Salinity Regime and Exchange Characteristics of a Shallow Coastal Bay System,
W74-03611 2L

Stagnant Sea,
W74-03712 5C

SALMONELLA
Direct Fluorescent-Antibody Technique for the Microbiological Examination of Food and Environmental Swab Samples for Salmonellae,
W74-03569 5A

System for Purification of Polluted Water,
W74-03655 5D

SALT MARSHES
Standing Crop of Salt Marshes Surrounding Chincoteague Bay, Maryland-Virginia,
W74-03304 2L

Nitrate and Nitrite in the Surface Waters of Two Delaware Salt Marshes,
W74-03538 5B

Ontogeny of a Salt Marsh Estuary,
W74-03621 2L

Intertidal Salt Marshes--Penalty.
W74-03727 6E

SALT MINES
Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

SALT WEDGE
Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

SAMPLE PREPARATION
A New Method for the Estimation of Absolute Microfossil Numbers, with Reference Especially to Diatoms,
W74-03285 5A

SAMPLE SIZE
Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

SAMPLING
Two-Level Skip-Lot Sampling Plans - Operating Characteristic Properties,
W74-03291 7C

SAMPLING EQUIPMENT
The Construction of a Sand Profile Sampler: Its Use in the Study of the Vorticella Populations and the General Interstitial Microfauna of Slow Sand Filters,
W74-03286 5A

SAN ANTONIO RIVER BASIN
The Water Resource Management Plan for the AACOG Planning Region, Volume I: Methodology Analysis of Water Resource Areas.
W74-03642 6B

SAN ANTONIO (TEX)
The Water Resource Management Plan for the AACOG planning Region, Volume II: Urban Water-Related Services.
W74-03643 6B

The Water Resource Management Plan for the AACOG Planning Region, Volume III: Short Range Program 1970-1975.
W74-03644 6B

SAN JACINTO RIVER BASIN (TEX)
Dams and Reservoirs in Texas: Part II,
W74-03375 8A

SAND BARS
Structure and Texture of a Gravelly Barrier Island in the Fitzroy Estuary, Western Australia, and the Role of Mangroves in the Shore Dynamics,
W74-03351 2L

The Coastal Shoals of Western Cuba and Their Deposits,
W74-03443 2L

SAND BYPASSING
Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

SAND FILTERS
The Construction of a Sand Profile Sampler: Its Use in the Study of the Vorticella Populations and the General Interstitial Microfauna of Slow Sand Filters,
W74-03286 5A

SAND MINING
Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

SAND REPLENISHMENT
The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

SAND SPITS
Ontogeny of a Salt Marsh Estuary,
W74-03621 2L

A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

SANDS
Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

SANDSTONES
Hydrodynamics of Mount Simon Sandstone, Ohio and Adjoining Areas,
W74-03235 5B

Deep-Well Injection of Desalting-Plant Waste Brine,
W74-03250 5E

SAPROBIC COMMUNITIES
The Structure of Saprobic Communities,
W74-03746 2I

SAPROBIC INDEX
The Reality of Three British Biotic Indices,
W74-03289 5A

SAPROPEL
Method of Digesting and Further Processing Fresh Sewage Sludge or Sapropel,
W74-03671 5D

SATELLITES (ARTIFICIAL)
Coastal Applications of the ERTS-A Satellite,
W74-03374 2J

SATURATION
Saturated Calcite Solutions from 10 to 40 Deg C: A Theoretical Study Evaluating the Solubility Product and Other Constants,
W74-03525 2K

SCOUR
Case History of Mission Bay Inlet, San Diego, California,
W74-03366 8B

SCYTOSIPHON LOMENTARIA
The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

SEA SPRAY
Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

SEA WATER
The Meteorological Effects on Microwave Apparent Temperatures Looking Downward Over a Smooth Sea,
W74-03511 7B

Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

Aquatic Sediment as a Habitat of Emericellopsis, With a Description of an Undescribed Species of Cephalosporium,
W74-03568 5A

SEA WATER PURIFICATION
Method and Apparatus for Purifying Sea Water,
W74-03654 3A

SEAPORT CONSTRUCTION
Methods of the Calculation of Cost-Benefit in the Construction of Seaports,
W74-03464 6B

SEASONAL
A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism,
W74-03626 5C

SEASONAL VARIATION
Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

SEDIMENT DISTRIBUTION
Recent Coastal Sedimentation: Central Louisiana Coast,
W74-03345 2L

SEDIMENT LEVEL INDICATORS
Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

SEDIMENT TRANSPORT
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

Response of the Lower Mississippi River to Changes in Valley Slope, Sinuosity and Water Temperature,
W74-03216 2E

Morphometric Analysis of Short-Period Changes in the Topography of the Shore,
W74-03341 2J

Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

Effects of Particle Size and Wave State on Grain Dispersion,
W74-03344 2L

The Relationships Between Wind Records, Energy of Longshore Drift, and Energy Balance Off the Coast of a Restricted Body of Water, As Applied to the Baltic,
W74-03431 2J

Dynamic Characteristics of West Florida Gulf Coast Beaches,
W74-03437 2J

Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

The Possibility of Calculating the Sand Drift Along a Shallow-Water Coastt. II. Definition of the Basic Concepts and Terms and Formulation of the Problem of Determining the Drift,
W74-03447 2J

The Effect of Currents on the Mass Transport of Progressive Water Waves,
W74-03455 2L

Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

Model Study on the Filling-Up of a Fishery Harbor by Drifting Sand,
W74-03691 2L

A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

Suspended Sediment in a Tidal Estuary,
W74-03696 2L

Mathematical Simulation of Bottom Sediment Motion by Waves,
W74-03698 2J

Hydraulic Survey and Model Investigation of the Inner Rana Fjord,
W74-03701 2L

A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

SEDIMENT YIELD
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

SEDIMENTARY STRUCTURES
Structure and Texture of a Gravelly Barrier Island in the Fitzroy Estuary, Western Australia, and the Role of Mangroves in the Shore Dynamics,
W74-03351 2L

SEDIMENTATION
Movement and Accumulation of Suspended Sediment During Basin Recharge,
W74-03240 4B

Mortality of Market-Sized Oysters (Crassostrea Virginica) in the Vicinity of a Dredging Operation,
W74-03305 5C

Recent Coastal Sedimentation: Central Louisiana Coast,
W74-03345 2L

Case History of Mission Bay Inlet, San Diego, California,
W74-03366 8B

The Old Coastline of the Wash,
W74-03435 2L

Ontogeny of a Salt Marsh Estuary,
W74-03621 2L

Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

SEDIMENTATION

A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

Equilibrium Flow Areas of Tidal Inlets on Sandy Coasts,
W74-03695 8B

Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September, 1966. Volume II.
W74-03699 8B

Characteristics of Sedimentary Environments in Moriches Bay,
W74-03707 2L

Dams and Beach-Sand Supply in Southern California,
W74-03708 2J

SEDIMENTS

Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

Size Distributions of the Suspended Particles of the Chesapeake Bay Turbidity Maximum,
W74-03436 2L

The Coastal Environment of New England,
W74-03453 2L

Beach Cusps: Response to Plateau's Rule,
W74-03460 2J

SEDIMENTS (CLAY)

Heavy Metals in the Sediments of the Danube, Ems, Weser and Elbe Rivers in West Germany, (In German),
W74-03552 5B

SEICHES

Water Waves From Underwater Explosions in Shallow Water, Part I: A Mathematical Model for Waves in Constant Depth and in Shoaling Water,
W74-03454 2L

Long Wave Study of Monterey Bay,
W74-03615 2L

Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

SEISMIC STUDIES

Feasibility Study of a Seismic Reflection Monitoring System for Underground Waste-Material Injection Sites,
W74-03230 5B

SELENIUM

Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

SEPARATION TECHNIQUES

A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

Quantitative Extraction of Adenosine Triphosphate From Cultivable and Host-Grown Microbes: Calculation of Adenosine Triphosphate Pools,
W74-03570 5A

Determination of Trace Organics in Air and Water,
W74-03576 5A

A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

Method of Separating Metals from Waste Water,
W74-03664 5D

SETTLING BASINS

Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

SEWAGE

Recycling Wastes for Mariculture,
W74-03714 5G

Zoning--Subdivision of Land.
W74-03723 6E

Water Pollution Control.
W74-03733 6E

SEWAGE BACTERIA

Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

Competitive Growth of Sewage Organisms,
W74-03567 5C

SEWAGE DISPOSAL

Central Bucks Joint School Building Authority V. Rawls (Action by Landowner to Recover Compensation for Alleged De Facto Taking of Property).
W74-03409 6G

State Assistance for Local Government.
W74-03412 6E

Recycling Wastes for Mariculture,
W74-03714 5G

Zoning--Subdivision of Land.
W74-03723 6E

Water Pollution Control.
W74-03733 6E

SEWAGE DISTRICTS

Sewerage Districts and Sewerage District Boards.
W74-03411 6E

SEWAGE EFFLUENTS

Central Bucks Joint School Building Authority V. Rawls (Action by Landowner to Recover Compensation for Alleged De Facto Taking of Property).
W74-03409 6G

Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

SEWAGE LAGOONS

Upgrading Lagoons,
W74-03495 5D

SEWAGE TREATMENT

Treatment of Domestic Sewage at Offshore Locations,
W74-03221 5D

Sewerage Districts and Sewerage District Boards.
W74-03411 6E

Upgrading Lagoons,
W74-03495 5D

Conventional Treatment Methods for Pulp and Paper Mill Wastes and Disposal on Land for Irrigation,
W74-03547 5D

Big Plant Will Treat Waste With Pure Oxygen.
W74-03638 5D

System for Purification of Polluted Water,
W74-03655 5D

Sewage Treatment Apparatus and Method,
W74-03656 5D

Sewage Treatment Process,
W74-03657 5D

Method of Digesting and Further Processing Fresh Sewage Sludge or Sapropel,
W74-03671 5D

SEWERAGE

State Assistance for Local Government.
W74-03412 6E

Water and Sewer Study: Part 2 Plans and Programs, Summary Report Buncombe County, North Carolina.
W74-03645 5G

SEWERS

A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

SHALES

Hydraulic Fracturing As a Tool for Disposal of Wastes in Shale,
W74-03231 5E

SHALLOW WATER

Morphometric Analysis of Short-Period Changes in the Topography of the Shore,
W74-03341 2J

Numerical Calculation of Wave Refraction Digital Computer,
W74-03343 8B

Recent Coastal Sedimentation: Central Louisiana Coast,
W74-03345 2L

Wave Set-Up on a Beach,
W74-03432 2E

Spectral Analysis of Shallow Water Waves in Lake Michigan,
W74-03439 2H

Series Solutions for Shallow Water Waves,
W74-03440 2E

Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

The Coastal Shoals of Western Cuba and Their Deposits,
W74-03443 2L

The Possibility of Calculating the Sand Drift Along a Shallow-Water Coastt. II. Definition of the Basic Concepts and Terms and Formulation of the Problem of Determining the Drift,
W74-03447 2J

The Spectral Structure of Waves in the Nearshore Zone,
W74-03448 2L

Falling Water Level Ripple Marks,
W74-03449 2L

The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

Water Waves From Underwater Explosions in Shallow Water, Part I: A Mathematical Model for Waves in Constant Depth and in Shoaling Water,
W74-03454 2L

Beach Cusps: Response to Plateau's Rule,
W74-03460 2J

Topographic Changes in the Surf Zone Profile,
W74-03609 2J

The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

On Singular Boundary Value Problems for the EPD Equation,
W74-03617 2E

Wind-Driven Waves,
W74-03673 2E

Numerical Calculation of Wind Waves in Shallow Water,
W74-03675 8B

Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

Response Characteristics of Underwater Wave Guide,
W74-03677 8B

Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

A Possibility of Generation of Surf Beats,
W74-03681 8B

A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

Wave Decaying Due to Breaking,
W74-03683 8B

Shock Pressure of Breaking Wave,
W74-03684 8B

The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

Runup Recipe for Periodic Waves on Uniformly Sloping Beaches,
W74-03686 8B

Transformation of Surges,
W74-03687 8B

A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

SHEAR STRESS
Wind Driven Water Currents,
W74-03619 8B

Depositional Behavior of Fine Sediment in a Turbulent Fluid Motion,
W74-03697 2J

SHELLFISH
State Shell-Fisheries.
W74-03732 6E

SHIPS
Some Technical and Economic Concerns Relating to Shipboard Pollution Abatement,
W74-03743 5D

SHOALING
The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

Runup Recipe for Periodic Waves on Uniformly Sloping Beaches,
W74-03686 8B

SHOALING WAVES
A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

SHOALS
The Coastal Shoals of Western Cuba and Their Deposits,
W74-03443 2L

SHOCK PRESSURE
Shock Pressure of Breaking Wave,
W74-03684 8B

SHORE PROTECTION
Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

SHORES
Remote Sensing in the Study of Coastal Processes,
W74-03373 7B

A Possibility of Generation of Surf Beats,
W74-03681 8B

SIMULATED RAINFALL
Design of Optimal Precipitation Networks,
W74-03333 2B

SIMULATION ANALYSIS
Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

Artificial Recharge in United Kingdom with Special Reference to London Basin,
W74-03225 4B

The Generation of Flood Damage Time Sequences,
W74-03334 4A

Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

SLOPES
Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

SLUDGE DISPOSAL
An Act to Regulate the Transportation for Dumping, and the Dumping of Material into Ocean Water, and for other Purposes.
W74-03399 6E

SLUDGE TREATMENT
Effect of Bark Addition on the Dewatering Properties of Biological Sludges.
W74-03544 5D

Wastewater Land Treatment Site Regulation Act.
W74-03725 6E

SLUDGES
Method of Digesting and Further Processing Fresh Sewage Sludge or Sapropel,
W74-03671 5D

SLURRY IRRIGATION
The Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W74-03339 5B

SMALL WATERSHEDS
Monitoring Nutrient Losses from Small Watersheds,
W74-03219 5B

SNOWPACKS
Fifth All-Union Symposium on Glaciology (O pyatom obshchesoyuznom glyatsiologicheskom simpoziume),
W74-03260 2C

SOCIAL ADJUSTMENT
Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

SOCIAL ASPECTS
Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

Wild, Scenic and Recreational Rivers System.
W74-03418 6E

Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

SOCIAL CHANGE
Changing Attitudes in Water Resources Development in the Province of Manitoba,
W74-03747 6B

SOCIAL IMPACT
Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

SOCIAL PARTICIPATION
The Resolution of Uncertainty,
W74-03479 5G

Socio-Economic Considerations in Water Resources Planning,
W74-03745 6B

SOCIAL VALUES
Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

Changing Attitudes in Water Resources Development in the Province of Manitoba,
W74-03747 6B

SOCIOECONOMIC MODELS
Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

SODIUM
Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

Suitability of Food Processing Waste Water for Irrigation,
W74-03482 5D

SODIUM ARSENITE
Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of Water Quality,
W74-03206 5C

SODIUM CHLORIDE
Competitive Growth of Sewage Organisms,
W74-03567 5C

SOIL ANALYSIS
Determination of Trichlorfon (0,0-Dimethyl (2,2,2-Trichloro-1-Hydroxyethyl)Phosphonate) in Forest Environmental Samples,
W74-03588 5A

SOIL (BLACKLAND)
Soil Surface Roughness and Straw Mulch for Maximum Beneficial Use of Rainfall by Corn on a Blackland Soil,
W74-03515 3F

SOIL DISPOSAL FIELDS
Conventional Treatment Methods for Pulp and Paper Mill Wastes and Disposal on Land for Irrigation,
W74-03547 5D

SOIL EROSION
Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

Potential of an Eroding Urban Soil for the Phosphorus Enrichment of Streams: I. Evaluation of Methods,
W74-03438 5B

SOIL TEMPERATURE
Edaphic Factors and Wilt of Coriander,
W74-03281 5C

SOIL WATER
Physiology of Drought Resistance in the Soybean Plant (Glycine max): I. The Relationship Between Drought Resistance and Growth,
W74-03475 3F

Organic Compounds in Soil Water of Some Ultisols of the Atlantic Coastal Plain,
W74-03494 2G

SOILS
Virus Removal in Hawaiian Soils,
W74-03293 5F

SOILS (WATERLOGGED)
Effect of Phosphate and Chloride Salts on Ammonification in Waterlogged Soils,
W74-03445 2G

Is Phosphate Reduced to Phosphine in Waterlogged Soils,
W74-03523 2G

SOLITARY WAVES
Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

SOLUBILITY
Saturated Calcite Solutions from 10 to 40 Deg C: A Theoretical Study Evaluating the Solubility Product and Other Constants,
W74-03525 2K

SORBENT BELTS
Sorbent Belt,
W74-03672 5G

SORTING
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

SOUTH CAROLINA
Geohydrology of Buried Triassic Basin at Savannah River Plant, South Carolina,
W74-03241 5E

SOUTHEAST U.S.
Monitoring Nutrient Losses from Small Watersheds,
W74-03219 5B

SOVEREIGN IMMUNITY
People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

SOYBEAN GROWTH
Physiology of Drought Resistance in the Soybean Plant (Glycine max): I. The Relationship Between Drought Resistance and Growth,
W74-03475 3F

SPAWNING
Tropical Bay in Danger,
W74-03716 6G

SPECIATION
Bottom Macrofauna in the Goczalkowice Dam Reservoir in the Years 1965-1969,
W74-03271 5C

Streptocephalus Moorei N. Sp., a New Fairy Shrimp (Anostraca) From Mexico,
W74-03319 2I

SPECIES ABUNDANCE
Comparative Ecology and Zooplankton of Two Maryland Ponds Including a Congeneric Occurrence of Diaptomus (Calanoida: Copepoda),
W74-03308 5C

SPECIES DIVERSITY
Species Diversity of Benthic Macroinvertebrates in the Des Moines River, Iowa,
W74-03211 5C

SPECTROPHOTOMETRY
Recent Studies of Mercury Analysis Procedures for Mill Effluents,
W74-03542 5A

SPECTROSCOPY
An Investigation of Atomic Absorption Analysis of Mill Effluent Metal Ion Content,
W74-03543 5A

Modified Atomic Absorption Spectroscopic Methods in Analyses of Trace Metals (Modifizierte atomabsorptionsspektroskopische Methoden zur Metallspuren-Analytik),
W74-03586 5A

SPECTRUM ANALYSIS
Spectral Analysis of Shallow Water Waves in Lake Michigan,
W74-03439 2H

SPIDER WEBS
A Sensitive Bio-Behavioral Assay for Methyl Mercury,
W74-03572 5A

SPIROCHAETA LITORALIS
Glucose and Pyruvate Metabolism of Spirochaeta litoralis, an Anaerobic Marine Spirochete,
W74-03600 5B

SPRAY IRRIGATION
Hydrogeologic Considerations in Land Spreading of Sewage Treatment-Plant Effluent in Central Florida,
W74-03518 5D

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

Engineering Design Criteria for Spray Irrigation,
W74-03521 5D

SPRINGS
Limestone Springs and Individual Flood Events, (With Special Reference to the Gower Peninsula, Wales),
W74-03512 2F

SPRINKLER IRRIGATION
Hydrogeologic Considerations in Land Spreading of Sewage Treatment-Plant Effluent in Central Florida,
W74-03518 5D

Engineering Design Criteria for Spray Irrigation,
W74-03521 5D

STAINING
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

STANDARD METHODS
Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

STANDARDS
A Planning Model for A Water Quality Management Agency,
W74-03469 5G

STANDING CROPS
Standing Crop of Salt Marshes Surrounding Chincoteague Bay, Maryland-Virginia,
W74-03304 2L

Regressions Between Biological Oceanographic Measurements in the Eastern Tropical Pacific and Their Significance to Ecological Efficiency,
W74-03559 5B

STANDING (LEGAL)
People of Saipan V. United States Dept. of Interior (Action to Enjoin Construction of Hotel on Public Land Until Environmental Impact of Hotel Has Been Evaluated).
W74-03406 6E

STATE GOVERNMENTS
Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

California Coastal Zone Conservation Act, Interim Permit Control, General,
W74-03379 6F

The California State Water Project in 1968,
W74-03502 6B

STATISTICAL METHODS
Procedures for Testing the Difference of Means with Incomplete Data,
W74-03581 7C

STATUTE
Recreational Use of Land and Water Areas--Liability of Owners.
W74-03726 6E

STATUTES
Interstate Drains.
W74-03400 6E

STERILIZATION
Sewage Treatment Apparatus and Method,
W74-03656 5D

STOCHASTIC PROCESSES
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

STORAGE CAPACITY
Effect of Formation Dip on the Movement of Fresh Water Stored in Saline Aquifers,
W74-03336 4B

STORM SURGE
Dynamics and Morphology of the Sambian Peninsula,
W74-03462 2J

STORM SURGES
Conditions of Beach Retrogression in a Low-Energy Environment,
W74-03456 2J

Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

STORMS
Beach Changes, on the Central Texas Coast Associated with Hurricane Fern, September, 1971,
W74-03433 2J

Conditions of Beach Retrogression in a Low-Energy Environment,
W74-03456 2J

STRATIFICATION
Preliminary Report on the Hydrography of the Pensacola Bay Estuary, Florida,
W74-03347 2L

Hydraulic Survey and Model Investigation of the Inner Rana Fjord,
W74-03701 2L

STRATIFIED FLOW
Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

STRAW MULCH TREATMENT
Soil Surface Roughness and Straw Mulch for Maximum Beneficial Use of Rainfall by Corn on a Blackland Soil,
W74-03515 3F

STREAMFLOW
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

Response of the Lower Mississippi River to Changes in Valley Slope, Sinuosity and Water Temperature,
W74-03216 2E

An Evaluation of Water-Quality Data Obtained at Four Streamflow Daily-Record Stations in Idaho,
W74-03507 5A

STREAMS
Multiple Outlet Selective Withdrawal Technique for Water Quality Prediction of Lake Releases,
W74-03218 5B

STREPTOCEPHALUS MOOREI
Streptocephalus Moorei N. Sp., a New Fairy Shrimp (Anostraca) From Mexico,
W74-03319 2I

STRUCTURAL BEHAVIOR
American Falls Dam, Upper Snake River Project, Idaho.
W74-03419 6E

STRUCTURES
A Bill to Amend the Ports and Waterways Safety Act of 1972.
W74-03392 6E

U.S. V. Joseph G. Moretti, Inc. (Land Fills Deemed 'Structures' Under Rivers and Harbors Act of 1899).
W74-03416 6E

SUBSURFACE WATERS
Effects of Highways on Surface and Subsurface Waters,
W74-03607 4C

SUCCESSION
Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

SUCKERS
Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1968 to June 30, 1969,
W74-03269 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1969 to January 31, 1970,
W74-03270 8I

SULFATES
Biogenic Metamorphosis of Water in Lakes of the Amu-Dar'Ya Delta (O biogennoy metamorfizatsii vody v ozerakh del'ty Amudar'i),
W74-03531 2H

SULFIDES
Dissimilatory Reduction of Inorganic Sulfur by Facultatively Anaerobic Marine Bacteria,
W74-03597 5C

SULFUR
Dissimilatory Reduction of Inorganic Sulfur by Facultatively Anaerobic Marine Bacteria,
W74-03597 5C

SUNFISHES
Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

SUPERCOOLING
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

SURF
Maximum Breaker Height for Design,
W74-03363 8B

Suspended Sediment and Longshore Sediment Transport Data Review,
W74-03368 2J

Longshore Transport of Suspended Sediment,
W74-03369 2J

A Possibility of Generation of Surf Beats,
W74-03681 8B

SURF ZONE
Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

Topographic Changes in the Surf Zone Profile,
W74-03609 2J

SURFACE DRAINAGE
The Imperiled Everglades,
W74-03720 6G

SURFACE-GROUNDWATER RELATIONSHIPS
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

SURFACE TENSION
Backscattering from a Two-Scale Rough Surface with Application to Radar Sea Return,
W74-03509 7B

SURFACE TENSION

A Non-Coherent Model for Microwave Emissions and Backscattering from the Sea Surface,
W74-03510 7B

SURFACE WATERS

An Evaluation of Water-Quality Data Obtained at Four Streamflow Daily-Record Stations in Idaho,
W74-03507 5A

Backscattering from a Two-Scale Rough Surface with Application to Radar Sea Return,
W74-03509 7B

A Non-Coherent Model for Microwave Emissions and Backscattering from the Sea Surface,
W74-03510 7B

The Meteorological Effects on Microwave Apparent Temperatures Looking Downward Over a Smooth Sea,
W74-03511 7B

Effects of Highways on Surface and Subsurface Waters,
W74-03607 4C

SURFACTANTS

Method of Separating Metals from Waste Water,
W74-03664 5D

SURGES

Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

Transformation of Surges,
W74-03687 8B

SUSPENDED LOAD

A Gross Longshore Transport Rate Formula,
W74-03367 2J

Suspended Sediment and Longshore Sediment Transport Data Review,
W74-03368 2J

Longshore Transport of Suspended Sediment,
W74-03369 2J

SUSPENDED SOLIDS

Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

Method and Apparatus for Purifying Sea Water,
W74-03654 3A

Suspended Sediment in a Tidal Estuary,
W74-03696 2L

Depositional Behavior of Fine Sediment in a Turbulent Fluid Motion,
W74-03697 2J

SWIMMING POOLS

Filtration System for Liquids,
W74-03662 5F

SWITZERLAND

Modification of Artificially Recharged Water in Switzerland,
W74-03234 5B

SYMPOSIUM

Proceedings, Mississippi Water Resources Conference, 1973.
W74-03212 5B

SYSTEMATICS

Bottom Macrofauna in the Goczalkowice Dam Reservoir in the Years 1965-1969,
W74-03271 5C

Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

Streptocephalus Moorei N. Sp., a New Fairy Shrimp (Anostraca) From Mexico,
W74-03319 2I

SYSTEMS ANALYSIS

Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

TABASCO (MEX)

Tabasco Beach-Ridge Plain: An Eroding Coast,
W74-03441 2J

TALLAHASSEE (FLA)

Engineering Design Criteria for Spray Irrigation,
W74-03521 5D

TALLAHATCHIE RIVER BASIN (MISS)

Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

TAX SEVERITY INDEX

Reservoirs and Local Government Finance,
W74-03748 6B

TAXES

Reservoirs and Local Government Finance,
W74-03748 6B

TENNESSEE

The Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W74-03339 5B

Criminal Offenses--Pollution).
W74-03722 6E

Establishment of Airports on Public Waters and Reclaimed Lands.
W74-03731 6E

TERTIARY TREATMENT

Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

TESTING

Procedures for Testing the Difference of Means with Incomplete Data,
W74-03581 7C

TESTING PROCEDURES

User Attitudes Toward Water Quality and Price, Las Vegas Valley and Reno-Sparks, Nevada,
W74-03331 5G

TETRAHYMENA PYRIFORMIS

Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

TEXAS

Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

Character and Stability of a Natural Tidal Inlet,
W74-03365 2L

Dams and Reservoirs in Texas: Part II,
W74-03375 8A

Corporate Immunity From Prosecution under the Federal Water Pollution Control Act.
W74-03376 5G

U.S. v. Reynolds Metals Company (Corporate Immunity for Pollution Under Rivers and Harbors Act of 1899),
W74-03426 6E

Beach Changes, on the Central Texas Coast Associated with Hurricane Fern, September, 1971,
W74-03433 2J

The Economic Impact of a Deepwater Terminal in Texas,
W74-03489 6B

The Salinity Regime and Exchange Characteristics of a Shallow Coastal Bay System,
W74-03611 2L

Selected Legal and Institutional Aspects of the Texas Coastal Zone.
W74-03630 6E

The Water Resource Management Plan for the AACOG Planning Region, Volume I: Methodology Analysis of Water Resource Areas.
W74-03642 6B

The Water Resource Management Plan for the AACOG planning Region, Volume II: Urban Water-Related Services.
W74-03643 6B

The Water Resource Management Plan for the AACOG Planning Region, Volume III: Short Range Program 1970-1975.
W74-03644 6B

TEXAS HIGH PLAINS REGION

Economic Benefits from Irrigation,
W74-03487 6C

THAILAND (CHAO PHYA ESTUARY)

Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

THERMAL CAPACITY

Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

THERMAL EXPANSION

Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

THERMAL POLLUTION

Nomographs for Thermal Pollution Control Systems,
W74-03329 5D

Cleanup of Polluted Rhine River Will Cost Western Europe Billions.
W74-03637 5G

Hyperbolic Cross Flow Cooling Tower with Basins and Fill Integrated into Shell,
W74-03668 5D

THERMAL POWER PLANTS
Nomographs for Thermal Pollution Control Systems,
W74-03329 5D

THERMAL PROPERTIES
Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

TIDAL CURRENTS
Approach of Tides to the Hawaiian Islands,
W74-03620 2E

Equilibrium Flow Areas of Tidal Inlets on Sandy Coasts,
W74-03695 8B

TIDAL EFFECTS
Tidal Resonance in the Bay of Fundy and Gulf of Maine,
W74-03434 2L

Size Distributions of the Suspended Particles of the Chesapeake Bay Turbidity Maximum,
W74-03436 2L

Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

The Effects of Water Conservation Works on the Regime of Morecambe Bay,
W74-03483 4A

The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

Hydraulic Survey and Model Investigation of the Inner Rana Fjord,
W74-03701 2L

TIDAL FLATS
Falling Water Level Ripple Marks,
W74-03449 2L

TIDAL MARSHES
The Old Coastline of the Wash,
W74-03435 2L

TIDES
Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

Suspended Sediment in a Tidal Estuary,
W74-03696 2L

Shore Protection on the Coast of 'Yaizu',
W74-03700 8B

TILAPIA ZILLII
Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

TIMBER HARVESTING
A Bill to Establish the French Pete Creek National Woodlands Recreation Area.
W74-03391 6E

TIME SERIES ANALYSIS
The Generation of Flood Damage Time Sequences,
W74-03334 4A

TOPOGRAPHIC FEATURES
Beach Cusps: Response to Plateau's Rule,
W74-03460 2J

TOPOGRAPHY
Morphometric Analysis of Short-Period Changes in the Topography of the Shore,
W74-03341 2J

Coastal Surface Currents Around New Zealand,
W74-03458 2E

Dynamics and Morphology of the Sambian Peninsula,
W74-03462 2J

Longshore Currents and Nearshore Topographies,
W74-03627 2E

TOXICITY
Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

Toxicity of Lead Nitrate to Algae,
W74-03595 5C

Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

TRACE ELEMENTS
Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

Trace-Element Distribution in the Continental-Shelf Sediments off the East Coast of India,
W74-03350 2J

Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

Complexing Capacity of Natural Water - Its Significance and Measurement,
W74-03578 5A

Modified Atomic Absorption Spectroscopic Methods in Analyses of Trace Metals (Modifizierte atomabsorptionsspektroskopische Methoden zur Metallspuren-Analytik),
W74-03586 5A

TRACERS
Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

Preliminary Results and Comparison of Dye Tracer Studies Conducted in Harbors, Estuaries, and Coastal Waters,
W74-03705 5B

TRANSMISSIVITY
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

TRANSPIRATION
Immediate Resumption of Growth by Radiata Pine After Five Months of Minimal Transpiration During Drought,
W74-03519 2D

The Significance of the Fallow Year in the Dry-Farming System of the Great Konya Basin, Turkey,
W74-03605 3F

TRANSPORTATION
EPA Pollution Regulations and Fuel Shortage: The Impact on Mass Transit.
W74-03711 5G

TREATMENT FACILITIES
Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

Pretreatment of Poultry Processing Wastes: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03497 5D

Upgrading Existing Wastewater Treatment Plants: Case Histories,
W74-03500 5D

Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

Forest Industry's Environmental Pollution Control in Finland. The Finnish Forest Industry's Water Protection Investment Programme.
W74-03546 5D

New Composite Effluent-Purification Equipment (Novyi kompleks ochistnykh sooruzhenii),
W74-03554 5D

Power Input for the Surface Aerator in Waste Water Treatment Plants (Prikon povrchoveho aeracniho michadla pro cisteni odpadnich vod),
W74-03555 5D

Wastewater Land Treatment Site Regulation Act.
W74-03725 6E

TREE RINGS (ANNUAL)
Formation of the Annual Ring and the Accumulation of Organic Matter in Trees, (In Russian).
W74-03466 2I

TRIAZINE PESTICIDES
Photochemistry of Bioactive Compounds. Kinetics of Selected s-Triazines in Solution,
W74-03582 5A

TRIBUTARIES
A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

TRICHLORFON
Determination of Trichlorfon (0,0-Dimethyl (2,2,2-Trichlorok1-Hydroxyethyl)Phosphonate) in Forest Environmental Samples,
W74-03588 5A

TRICHOPTERA
The Influences of an Urban Area and a Reservoir on Benthic Macroinvertebrate Production in the Des Moines River, Iowa,
W74-03209 5C

Analysis of the Benthic Macroinvertebrate Community Structure for Assessment of Water Quality of Des Moines River,
W74-03210 5C

TRINITY RIVER BASIN (TEX)
Dams and Reservoirs in Texas: Part II,
W74-03375 8A

TROPHIC LEVEL
An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

TROUT
Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

TSIMLYANSK RESERVOIR
Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

TSUNAMIS
Pilot Model Study for the Design of Hilo Harbor Tsunami Model. Hydraulic Model Investigation,
W74-03613 8B

TUNDRA
Distribution Patterns of Organic Matter in River Waters of the Wooded Tundra Zone (Zakonomernosti raspredeleniya organicheskogo veshchestva rechnykh vod lesotundrovoy zony),
W74-03255 2K

Distribution and Characteristics of Organic Matter in River Waters of the Tundra Zone (Raspredeleniye i osobennosti organicheskikh veshchestv rechnykh vod tundrovoy zony),
W74-03534 2K

TURBELLARI
The Occurrence of Microturbellaria in Some British Lakes of Diverse Chemical Content,
W74-03282 5C

TURBELLARIA
Observations on the Ecology and Distribution of the Turbellarian Fauna of the Danube Delta (Beobachtungen uber die Okologie und Verbreitung der Turbellarienfauna im Donaudelta),
W74-03574 5C

TURBIDITY
Size Distributions of the Suspended Particles of the Chesapeake Bay Turbidity Maximum,
W74-03436 2L

TURBINES
Look, No Clarifier,
W74-03220 5F

TURBULENCE
Features of Horizontal Turbulence in the Littoral Zone of the Ocean,
W74-03452 2E

Depositional Behavior of Fine Sediment in a Turbulent Fluid Motion,
W74-03697 2J

TURBULENT FLOW
Dispersion in Hydrologic and Coastal Environments,
W74-03327 5B

TURKEY (GREAT KONYA BASIN)
The Significance of the Fallow Year in the Dry-Farming System of the Great Konya Basin, Turkey,
W74-03605 3F

TWO-WELL WASTE INJECTION
History of a Two-Well Industrial-Waste Disposal System,
W74-03247 5E

TYPHOONS
Numerical Calculation of Wind Waves in Shallow Water,
W74-03675 8B

ULTISOLS
Organic Compounds in Soil Water of Some Ultisols of the Atlantic Coastal Plain,
W74-03494 2G

ULTRASONICS
Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

ULTRAVIOLET RADIATION
Photodecomposition of P-Chlorophenoxyacetic Acid,
W74-03583 5B

UNCONSOLIDATED SEDIMENTS
Dynamics and Morphology of the Sambian Peninsula,
W74-03462 2J

UNDERGROUND WASTE DISPOSAL
Underground Waste Management and Artificial Recharge, Volumes 1 and 2.
W74-03222 5E

Underground Waste Disposal and Artificial Recharge in Japan,
W74-03226 5E

Subsurface Disposal of Liquid Industrial Wastes in Alabama--A Current Status Report,
W74-03227 5E

Hydraulic Fracturing As a Tool for Disposal of Wastes in Shale,
W74-03231 5E

Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

Geohydrology of Buried Triassic Basin at Savannah River Plant, South Carolina,
W74-03241 5E

Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

Role of Bacteria in Decomposition of Injected Liquid Waste at Wilmington, North Carolina,
W74-03246 5B

History of a Two-Well Industrial-Waste Disposal System,
W74-03247 5E

Subsurface Disposal of Waste in Kansas,
W74-03248 5E

Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

Hazards of Waste Disposal in Groundwater Basins,
W74-03357 5E

Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

Feasibility Study of Liquid-Waste Injection into Aquifers Containing Salt Water, Wilmington, North Carolina,
W74-03362 5E

UNDERWATER EXPLOSIONS
Model Studies of Impulsively-Generated Water Waves.
W74-03689 8B

UNITED STATES
Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

The Substantive Right to Environmental Quality Under the National Environmental Policy Act,
W74-03384 6E

A Bill to Amend the Fish and Wildlife Coordination Act by Providing for Regulation of Dumping in United States Waters.
W74-03390 6E

A Bill to Establish the French Pete Creek National Woodlands Recreation Area.
W74-03391 6E

A Bill to Amend the Ports and Waterways Safety Act of 1972.
W74-03392 6E

Concurrent Resolution Expressing the Sense of the Congress with Respect to Water Pollution.
W74-03393 6E

A Bill to Establish a National Flood Plain Policy.
W74-03394 6E

A Bill to Implement the International Convention on Civil Liability for Oil Pollution Damage and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage.
W74-03395 6E

A Bill Authorizing the Construction, Repair, and Preservation of Certain Public Works on Rivers and Harbors for Navigation, Flood Control, and Other Purposes.
W74-03396 6E

An Act to Regulate the Transportation for Dumping, and the Dumping of Material into Ocean Water, and for other Purposes.
W74-03399 6E

UPOGEBIA AFFINIS
Larvae of the Burrowing Shrimp, Upogebia Affinis, (Crustacea, Decapoda, Upogebiidae) from Virginia Plankton,
W74-03303 2L

UPWELLING
The Anchovy Crisis,
W74-03473 6C

URANIUM
Titrimetric Determination of Uranium with Electrogenerated Vanadium (V),
W74-03564 2K

URBAN DEVELOPMENT
Potential of an Eroding Urban Soil for the Phosphorus Enrichment of Streams: I. Evaluation of Methods,
W74-03438 5B

URBAN GROWTH
Water Study, Santa Fe Planning Area.
W74-03641 4B

URBAN RUNOFF
A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

URBANIZATION
The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

Natural Features Element of the Comprehensive Plan: A Plan for Action.
W74-03633 4C

UREAS
Biodegradation of Urea in River Waters Under Controlled Laboratory Conditions,
W74-03287 5B

URINE
Modified Atomic Absorption Spectroscopic Methods in Analyses of Trace Metals (Modifizierte atomabsorptionsspektroskopische Methoden zur Metallspuren-Analytik),
W74-03586 5A

USSR
Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

USSR (AGRAKHANSKIY BAY)
Chemical Composition of Water in Agrakhanskiy Bay (O khimicheskom sostave vody Agrakhanskogo zaliva),
W74-03527 2K

USSR (AMU-DAR'YA RIVER)
Biogenic Metamorphosis of Water in Lakes of the Amu-Dar'Ya Delta (O biogennoy metamorfizatsii vody v ozerakh del'ty Amudar'i),
W74-03531 2H

USSR (CRIMEAN LOWLAND)
Role of Present-Day Waters in the Karstification of Carbonate Rocks on the Crimean Lowland (Rol' sovremennykh vod v zakarstovanii karbonatnykh porod ravninnogo Kryma),
W74-03258 2K

USSR (DNIEPER RIVER)
Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

USSR (DON RIVER)
Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

USSR (KAMCHATKA)
Investigation of Runoff of Kamchatka Rivers Based on Climatic Data (Issledovaniye stoka rek Kamachatki po klimaticheskim dannym),
W74-03259 2E

USSR (LAKE BAIKAL)
Readily Hydrosable Organic Matter in Bottom Sediments of Lake Baikal, (In Russian),
W74-03715 5C

USSR (LAKE SEVAN)
The Formation of Phytocenoses on the Liberated Ground of Lake Sevan, (In Russian),
W74-03632 2H

USSR (NORTHERN CAUCASUS)
Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

USSR (OKA RIVER)
Life Cycle of Orchardgrass (Dactylis glomerata L.) in the Flood Meadows of the Oka River: I, (In Russian),
W74-03604 2I

USSR (SHUMAK RIVER)
Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

USSR (TROITSK RESERVOIR)
Ion Load and Carbonate Equilibrium in the Troitsk Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

USSR (TSIMLYANSK RESERVOIR)
A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

USSR (VOLGA RIVER)
Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

Dynamics of Phytoplankton in the Lower Volga and the Main Channels of its Delta, (In Russian),
W74-03646 5C

USSR (VORONEZH)
Some Data on Fluorine, Bromine, and Iodine Concentrations in Atmospheric Precipitation at Voronezh (Nekotoryye dannyye o soderzhanii ftora, broma i ioda v atmosfernykh osadkakh g. Voronezha),
W74-03251 5A

USSR (YEVPATORIYA)
Investigation of the Chemical Composition of Atmospheric Precipitation in the Vicinity of Yevpatoriya (Issledovaniye khimicheskogo sostava atmosfernykh osadkov v rayone g. Yevpatorii),
W74-03526 2K

VACUUM DRYING
Effect of Bark Addition on the Dewatering Properties of Biological Sludges.
W74-03544 5D

VARVE DEPOSITION
Importance of Diatoms in the Present Varve Deposition (Alternation of Annual Layers) of Green Lake (Near Fayetteville, N.Y.), Model of Confined Sedimentation, (In French),
W74-03577 2H

VELIGERS
Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

VIRGINIA
Underground Storage and Retrieval of Fresh Water from A Brackish-Water Aquifer,
W74-03237 4B

The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

Commonwealth, Marine Resources Commission v. Forbes (Suit by State Alleging Defendants, Without Authority, Had Deposited Fill Upon State Owned Subaqueous Beds of River; Praying for Injunctive Relief).
W74-03423 6E

Campaign Clean Water, Inc. v. Ruckelshaus, (Action Brought Against Administrator of Environmental Protection Agency Challenging Impoundment with Respect to Funds Authorized to be Appropriated by Congress).
W74-03424 6E

VIRUSES
Virus Removal in Hawaiian Soils,
W74-03293 5F

VOLUMETRIC ANALYSIS
Titrimetric Determination of Uranium with Electrogenerated Vanadium (V),
W74-03564 2K

WALES (GOWER PENINSULA)
Limestone Springs and Individual Flood Events, (With Special Reference to the Gower Peninsula, Wales),
W74-03512 2F

WARNING SYSTEMS
Design of Optimal Precipitation Networks,
W74-03333 2B

WASH (ENGLAND)
The Old Coastline of the Wash,
W74-03435 2L

WASHINGTON
A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

WASTE DISPOSAL
A Bill to Amend the Fish and Wildlife Coordination Act by Providing for Regulation of Dumping in United States Waters.
W74-03390 6E

An Act to Regulate the Transportation for Dumping, and the Dumping of Material into Ocean Water, and for other Purposes.
W74-03399 6E

Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

WASTE DISPOSAL WELLS
Underground Waste Management and Artificial Recharge, Volumes 1 and 2.
W74-03222 5E

Underground Waste Disposal and Artificial Recharge in Japan,
W74-03226 5E

Subsurface Disposal of Liquid Industrial Wastes in Alabama--A Current Status Report,
W74-03227 5E

Role of Borehole Geophysics in Underground Waste Storage and Artificial Recharge,
W74-03229 5E

Feasibility Study of a Seismic Reflection Monitoring System for Underground Waste-Material Injection Sites,
W74-03230 5B

Hydraulic Fracturing As a Tool for Disposal of Wastes in Shale,
W74-03231 5E

Radioactive- and Chemical-Waste Transport in Groundwater at National Reactor Testing Station, Idaho: 20-Year Case History and Digital Model,
W74-03233 5B

Hydrodynamics of Mount Simon Sandstone, Ohio and Adjoining Areas,
W74-03235 5B

Artificial Recharge of Treated Waste Waters and Rainfall Runoff into Deep Saline Aquifers of Peninsula of Florida,
W74-03242 5E

Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

Role of Bacteria in Decomposition of Injected Liquid Waste at Wilmington, North Carolina,
W74-03246 5B

History of a Two-Well Industrial-Waste Disposal System,
W74-03247 5E

Subsurface Disposal of Waste in Kansas,
W74-03248 5E

Deep-Well Injection of Desalting-Plant Waste Brine,
W74-03250 5E

Artificial Recharge--State of the Art,
W74-03354 4B

Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

Feasibility Study of Liquid-Waste Injection into Aquifers Containing Salt Water, Wilmington, North Carolina,
W74-03362 5E

WASTE DUMPS
Mercury Pollution and Enforcement of the Refuse Act of 1899 (Part 2).
W74-03558 5G

WASTE TREATMENT
Recycling on the Land: An Alternative for Water Pollution Control,
W74-03387 5D

Pretreatment of Poultry Processing Wastes: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03497 5D

Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

WASTE WATER DISPOSAL
Design and Operation of Land Treatment Systems for Minimum Contamination of Groundwater,
W74-03223 5D

Effects of Waste Percolation of Groundwater in Alluvium Near Barstow, California,
W74-03228 5E

Modification of Artificially Recharged Water in Switzerland,
W74-03234 5B

Hydrogeologic Considerations in Land Spreading of Sewage Treatment-Plant Effluent in Central Florida,
W74-03518 5D

Engineering Design Criteria for Spray Irrigation,
W74-03521 5D

Wastewater Land Treatment Site Regulation Act.
W74-03725 6E

WASTE WATER (POLLUTION)
Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

Central Bucks Joint School Building Authority V. Rawls (Action by Landowner to Recover Compensation for Alleged De Facto Taking of Property).
W74-03409 6G

Sewerage Districts and Sewerage District Boards.
W74-03411 6E

A Planning Model for A Water Quality Management Agency,
W74-03469 5G

Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

Determination of Trace Organics in Air and Water,
W74-03576 5A

WASTE WATER TREATMENT
Removal of Phosphate from Waste Water by Aluminum and Iron, Phase III,
W74-03208 5D

Recycling on the Land: An Alternative for Water Pollution Control,
W74-03387 5D

Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

Oxygen Activated Sludge Wastewater Treatment Systems: Design Criteria and Operating Experience,
W74-03496 5D

Pretreatment of Poultry Processing Wastes: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03497 5D

In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

Upgrading Existing Wastewater Treatment Plants: Case Histories,
W74-03500 5D

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

Forest Industry's Environmental Pollution Control in Finland. The Finnish Forest Industry's Water Protection Investment Programme.
W74-03546 5D

Conventional Treatment Methods for Pulp and Paper Mill Wastes and Disposal on Land for Irrigation,
W74-03547 5D

Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

New Composite Effluent-Purification Equipment (Novyi kompleks ochistnykh sooruzhenii),
W74-03554 5D

Power Input for the Surface Aerator in Waste Water Treatment Plants (Prikon povrchoveho aeracniho michadla pro cisteni odpadnich vod),
W74-03555 5D

pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

Big Plant Will Treat Waste With Pure Oxygen.
W74-03638 5D

Iodine Treated Activated Carbon and Process of Treating Contaminated Water Therewith,
W74-03651 5D

Method for Purifying Water,
W74-03652 5D

System for Purification of Polluted Water,
W74-03655 5D

Sewage Treatment Apparatus and Method,
W74-03656 5D

Sewage Treatment Process,
W74-03657 5D

Water Circulation System for Fresh Water Fish Husbandry,
W74-03659 5D

Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

Method of Separating Metals from Waste Water,
W74-03664 5D

Phosphorous Removal from Wastewater,
W74-03667 5D

Hyperbolic Cross Flow Cooling Tower with Basins and Fill Integrated into Shell,
W74-03668 5D

Method of Digesting and Further Processing Fresh Sewage Sludge or Sapropel,
W74-03671 5D

Wastewater Land Treatment Site Regulation Act.
W74-03725 6E

Some Technical and Economic Concerns Relating to Shipboard Pollution Abatement,
W74-03743 5D

WATER ANALYSIS

Investigation of the Chemical Composition of Atmospheric Precipitation in the Vicinity of Yevpatoriya (Issledovaniye khimicheskogo sostava atmosfernykh osadkov v rayone g. Yevpatorii),
W74-03526 2K

Chemical Composition of Water in Agrakhanskiy Bay (O khimicheskom sostave vody Agrakhanskogo zaliva),
W74-03527 2K

Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

Review of Rapid BOD Test Methods,
W74-03557 5A

Determination of Trichlorfon (0,0-Dimethyl (2,2,2-Trichloro-1-Hydroxyethyl)Phosphonate) in Forest Environmental Samples,
W74-03588 5A

WATER BALANCE

The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

WATER CHEMISTRY

Underground Storage and Retrieval of Fresh Water from A Brackish-Water Aquifer,
W74-03237 4B

Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

Some Data on Fluorine, Bromine, and Iodine Concentrations in Atmospheric Precipitation at Voronezh (Nekotoryye dannyye o soderzhanii ftora, broma i ioda v atmosfernykh osadkakh g. Voronezha),
W74-03251 5A

A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

Distribution Patterns of Organic Matter in River Waters of the Wooded Tundra Zone (Zakonomernosti raspredeleniya organicheskogo veshchestva rechnykh vod lesotundrovoy zony),
W74-03255 2K

Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

Changes in Chemistry of Natural Waters of Cultivated Lands (Izmeneniya khimizma prirodnykh vod kul'turnykh landshaftov),
W74-03257 5B

Limestone Springs and Individual Flood Events, (With Special Reference to the Gower Peninsula, Wales),
W74-03512 2F

Saturated Calcite Solutions from 10 to 40 Deg C: A Theoretical Study Evaluating the Solubility Product and Other Constants,
W74-03525 2K

Investigation of the Chemical Composition of Atmospheric Precipitation in the Vicinity of Yevpatoriya (Issledovaniye khimicheskogo sostava atmosfernykh osadkov v rayone g. Yevpatorii),
W74-03526 2K

Chemical Composition of Water in Agrakhanskiy Bay (O khimicheskom sostave vody Agrakhanskogo zaliva),
W74-03527 2K

Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

Biogenic Metamorphosis of Water in Lakes of the Amu-Dar'Ya Delta (O biogennoy metamorfizatsii vody v ozerakh del'ty Amudar'i),
W74-03531 2H

Ion Load and Carbonate Equilibrium in the Troitsk Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

Distribution and Characteristics of Organic Matter in River Waters of the Tundra Zone (Raspredeleniye i osobennosti organicheskikh veshchestv rechnykh vod tundrovoy zony),
W74-03534 2K

Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

WATER CIRCULATION

The Coastal Environment of New England,
W74-03453 2L

Coastal Surface Currents Around New Zealand,
W74-03458 2E

WATER CONSERVATION
The Effects of Water Conservation Works on the Regime of Morecambe Bay,
W74-03483 4A

Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

New Composite Effluent-Purification Equipment (Novyi kompleks ochistnykh sooruzhenii),
W74-03554 5D

Water Control Apparatus Responsive to Leakage or Overflow Conditions,
W74-03663 4A

WATER CONTROL
Water Power.
W74-03413 6E

Models Predict Environment.
W74-03713 2L

WATER COOLING
Nomographs for Thermal Pollution Control Systems,
W74-03329 5D

WATER COURSES
Metropolitan Development Guide: Protection Open Space--Policy Plan, Program.
W74-03635 6G

WATER DEMAND
The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

Water Study, Santa Fe Planning Area.
W74-03641 4B

The Water Resource Management Plan for the AACOG planning Region, Volume II: Urban Water-Related Services.
W74-03643 6B

Water Supply and Distribution.
W74-03647 6D

2020 Plan, Board of Water Supply/City and County of Honolulu.
W74-03649 4B

Comprehensive Water Systems Needs Plan, 1970-2000, Allegheny County, Pennsylvania.
W74-03650 3D

The Optimal Time to Start the Operation of a Desalting Plant in Israel,
W74-03750 3A

WATER DEPTH
Response Characteristics of Underwater Wave Guide,
W74-03677 8B

Wave Decaying Due to Breaking,
W74-03683 8B

WATER DEPTH METERS
Circuit for Water Depth Meter,
W74-03666 7B

WATER DISTRIBUTION (APPLIED)
Minimum Cost Design of Water Distribution Systems,
W74-03205 8A

City of Midway V. Midway Nursing and Convalescent Center, Inc. (Suit by City to Enjoin Church from Furnishing Water to Nursing Home and Enjoin Nursing Home from Receiving Water from Other Defendants in Competition with City).
W74-03403 6E

Emphasizing Quality Control,
W74-03636 5F

Water Supply and Distribution.
W74-03647 6D

The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

WATER EXCHANGE SYSTEM
Proposed Municipal Waste Water--Groundwater Exchange, City of Tucson: Avra-Marana Valley.
W74-03340 5G

WATER FLOW
Saturated Water Flow Through Clay Pots,
W74-03306 3F

A Conveniently Constructed Divisor for Splitting Low Water Flows,
W74-03522 7B

WATER LAW
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

Water Law of Southeastern Estuaries,
W74-03463 6E

Selected Legal and Institutional Aspects of the Texas Coastal Zone.
W74-03630 6E

Establishment of Airports on Public Waters and Reclaimed Lands.
W74-03731 6E

WATER LEVELS
Deduction of Flow Patterns in Variable-Density Aquifers from Pressure and Water-Level Observations,
W74-03236 4B

Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

Circuit for Water Depth Meter,
W74-03666 7B

WATER MANAGEMENT (APPLIED)
Models Predict Environment.
W74-03713 2L

WATER MEASUREMENT
Instrumentation for Water Pollution Monitoring,
W74-03640 5D

WATER MITES
A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

WATER POLLUTION
Changes in Chemistry of Natural Waters of Cultivated Lands (Izmeneniya khimizma prirodnykh vod kul'turnykh landshaftov),
W74-03257 5B

Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

Environmental Law - Water Pollution Remedies - Use of Public Nuisance Theory in Suit by Federal Government - United States V. Ira S. Bushey and Sons, Inc.,
W74-03381 5G

Course of Action Under Federal Common Law for Pollution of Interstate Waters,
W74-03382 5G

A Bill to Amend the Fish and Wildlife Coordination Act by Providing for Regulation of Dumping in United States Waters.
W74-03390 6E

Soap and Detergent Association V. City of Chicago (Declaratory Action to Set Aside City Ordinance Prohibiting Sale of Phosphate Detergents).
W74-03414 6E

Kings County Economic Community Development Association V. Hardin (Payment of Farm Subsidies Do Not Require Nepa Approval).
W74-03417 6E

The Nation's Estuaries: San Francisco Bay and Delta, California.
W74-03420 5G

Charles v. Diamond (Extent to Which Police Powers May be Used to Disadvantage Interests in Private Property).
W74-03422 6E

Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

Stagnant Sea,
W74-03712 5C

Water Pollution Control.
W74-03733 5E

WATER POLLUTION ABATEMENT
Criminal Offenses--Pollution).
W74-03722 6E

WATER POLLUTION CONTROK
Water Pollution Control Handbook--A Citizens Guide to the Federal Water Pollution Control Act Amendments of 1972--Volume II,
W74-03388 5G

WATER POLLUTION CONTROL
Mathematical Modeling of Water Quality,
W74-03217 5B

Treatment of Domestic Sewage at Offshore Locations,
W74-03221 5D

Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

Toward Environmental Sanity,
W74-03346 5G

Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam,

and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

Concurrent Resolution Expressing the Sense of the Congress with Respect to Water Pollution.
W74-03393 6E

City of Champaign v. Environmental Protection Agency (Administrative Proceeding for Alleged Pollution Against City, University Board of Trustees and Others).
W74-03421 6E

Charles v. Diamond (Extent to Which Police Powers May be Used to Disadvantage Interests in Private Property).
W74-03422 6E

A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

Useful Waters for California.
W74-03504 5G

Master Plan for Water Supply, Bucks County, Pennsylvania, 1970.
W74-03629 3D

Responsibilities of Local Authorities for Water Pollution Control.
W74-03639 5G

Instrumentation for Water Pollution Monitoring,
W74-03640 5D

Water Pollution Control.
W74-03733 6E

Ohio River Valley Water Sanitation Commission.
W74-03736 6E

WATER POLLUTION EFFECTS

Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

Banklick Creek Watershed (Final Environmental Impact Statement).
W74-03398 4D

The Chironomids of the Periphyton in the Yugoslav Part of the River Danube (Die Chironomidenfauna aus dem Periphyton in der jugoslawischen Donaustrecke),
W74-03562 5A

Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

Distribution of Foraminifera Near Pollution Sources in Chaleur Bay,
W74-03596 5B

WATER POLLUTION SOURCES

City of Champaign v. Environmental Protection Agency (Administrative Proceeding for Alleged Pollution Against City, University Board of Trustees and Others).
W74-03421 6E

Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

WATER POLLUTION TREATMENT

Sewerage Districts and Sewerage District Boards.
W74-03411 6E

WATER PROPERTIES

Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

WATER PURIFICATION

Recycling on the Land: An Alternative for Water Pollution Control,
W74-03387 5D

Method and Apparatus for Purifying Sea Water,
W74-03654 3A

WATER QUALITY

Analysis of the Benthic Macroinvertebrate Community Structure for Assessment of Water Quality of Des Moines River,
W74-03210 5C

Mathematical Modeling of Water Quality,
W74-03217 5B

Monitoring Nutrient Losses from Small Watersheds,
W74-03219 5B

Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

User Attitudes Toward Water Quality and Price, Las Vegas Valley and Reno-Sparks, Nevada,
W74-03331 5G

The Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W74-03339 5B

Useful Waters for California.
W74-03504 5G

An Evaluation of Water-Quality Data Obtained at Four Streamflow Daily-Record Stations in Idaho,
W74-03507 5A

Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

WATER QUALITY ACT

Corporate Immunity From Prosecution under the Federal Water Pollution Control Act.
W74-03376 5G

Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

Campaign Clean Water, Inc. v. Ruckelshaus, (Action Brought Against Administrator of Environmental Protection Agency Challenging Impoundment with Respect to Funds Authorized to be Appropriated by Congress).
W74-03424 6E

WATER QUALITY CONTROL

Mathematical Modeling of Water Quality,
W74-03217 5B

Multiple Outlet Selective Withdrawal Technique for Water Quality Prediction of Lake Releases,
W74-03218 5B

Look, No Clarifier,
W74-03220 5F

Cape Henry Bird Club v. Laird (Action for Injunctive and Declaratory Relief, On Environmental Grounds, Against Federal Dam Project).
W74-03425 6E

A Planning Model for A Water Quality Management Agency,
W74-03469 5G

Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

Emphasizing Quality Control,
W74-03636 5F

Cleanup of Polluted Rhine River Will Cost Western Europe Billions.
W74-03637 5G

The Water Resource Management Plan for the AACOG Planning Region, Volume I: Methodology Analysis of Water Resource Areas.
W74-03642 6B

Water Facilities for East Orange Area for City of Orange and East Orange County Water District.
W74-03648 3D

WATER QUALITY STANDARDS

Pollution Control and the Behavior of the Firm--A Technical Note,
W74-03749 5G

WATER RESOURCE DEVELOPMENT

A Guide to Decision Making for Water Resources Management in the San Antonio Region.
W74-03484 6B

WATER RESOURCE PLANNING
Changing Attitudes in Water Resources Development in the Province of Manitoba,
W74-03747 6B

WATER RESOURCES
Proceedings, Mississippi Water Resources Conference, 1973.
W74-03212 5B

Department of Natural Resources--Divisions.
W74-03728 6E

WATER RESOURCES DEVELOPMENT
Proceedings, Mississippi Water Resources Conference, 1973.
W74-03212 5B

A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

Analyzing the Environmental Impacts of Water Projects.
W74-03472 6G

North Coastal Area Investigation. South Fork EEL River Study: A Summary of the Public Hearing Comments on the Preliminary Edition Dated January 1968, Final Supplement,
W74-03476 6B

Castaic Lake Area Recreation Development Plan,
W74-03481 6B

The California State Water Project in 1968,
W74-03502 6B

Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

Public Works for Water and Power Development and Atomic Energy Commission Appropriation Bill, 1974, Parts 1 and 2.
W74-03710 6E

WATER REUSE
Design and Operation of Land Treatment Systems for Minimum Contamination of Groundwater,
W74-03223 5D

Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

Dan Region, Israel, Sewage-Reclamation and Recharge Project,
W74-03359 5D

Suitability of Food Processing Waste Water for Irrigation,
W74-03482 5D

Hydrogeologic Considerations in Land Spreading of Sewage Treatment-Plant Effluent in Central Florida,
W74-03518 5D

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

WATER SOURCES
Water Facilities for East Orange Area for City of Orange and East Orange County Water District.
W74-03648 3D

WATER SPREADING
Artificial Recharge of Coastal-Plain Aquifer in Israel,
W74-03356 4B

Dan Region, Israel, Sewage-Reclamation and Recharge Project,
W74-03359 5D

WATER STORAGE
Saline Aquifers--Future Storage Reservoirs for Fresh Water,
W74-03224 5E

Underground Storage and Retrieval of Fresh Water from A Brackish-Water Aquifer,
W74-03237 4B

Emphasizing Quality Control,
W74-03636 5F

WATER STRUCTURE
Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

WATER SUPPLY
Proposed Municipal Waste Water--Groundwater Exchange, City of Tucson: Avra-Marana Valley.
W74-03340 5G

Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam, and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

North Coastal Area Investigation. South Fork EEL River Study: A Summary of the Public Hearing Comments on the Preliminary Edition Dated January 1968, Final Supplement,
W74-03476 6B

The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

The California State Water Project in 1968,
W74-03502 6B

Master Plan for Water Supply, Bucks County, Pennsylvania, 1970.
W74-03629 3D

Water Study, Santa Fe Planning Area.
W74-03641 4B

Water and Sewer Study: Part 2 Plans and Programs, Summary Report Buncombe County, North Carolina.
W74-03645 5G

Water Supply and Distribution.
W74-03647 6D

Water Facilities for East Orange Area for City of Orange and East Orange County Water District.
W74-03648 3D

2020 Plan, Board of Water Supply/City and County of Honolulu.
W74-03649 4B

Comprehensive Water Systems Needs Plan, 1970-2000, Allegheny County, Pennsylvania.
W74-03650 3D

WATER SUPPLY DEVELOPMENT
Agricultural Reconnaissance Supplement to the Mill Creek Development Project.
W74-03488 6D

WATER TEMPERATURE
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

The Meteorological Effects on Microwave Apparent Temperatures Looking Downward Over a Smooth Sea,
W74-03511 7B

Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

Competitive Growth of Sewage Organisms,
W74-03567 5C

WATER TREATMENT
Look, No Clarifier,
W74-03220 5F

Virus Removal in Hawaiian Soils,
W74-03293 5F

Recycling on the Land: An Alternative for Water Pollution Control,
W74-03387 5D

Emphasizing Quality Control,
W74-03636 5F

Filtration System for Liquids,
W74-03662 5F

WATER USERS
City of Midway V. Midway Nursing and Convalescent Center, Inc. (Suit by City to Enjoin Church from Furnishing Water to Nursing Home and Enjoin Nursing Home from Receiving Water from Other Defendants in Competition with City).
W74-03403 6E

WATER UTILIZATION
Comparative Analysis of Residential Water Use in Puerto Rico,
W74-03324 6D

Optimizing Water Use: The Return Flow Issue,
W74-03385 6E

Wild, Scenic and Recreational Rivers System.
W74-03418 6E

Recreational Use of Land and Water Areas--Liability of Owners.
W74-03726 6E

WATER WORKS
The Effects of Water Conservation Works on the Regime of Morecambe Bay,
W74-03483 4A

WATERFLEAS
A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

WATERFOWL HABITATS
Waterfowl Habitat Trends in the Aspen Parkland of Manitoba,
W74-03517 4C

WATERSHED MANAGEMENT
Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

WAVE ACTION
Falling Water Level Ripple Marks,
W74-03449 2L

A Model Study of the Entrance Channel Depoe Bay, Oregon,
W74-03614 8B

Equilibrium Flow Areas of Tidal Inlets on Sandy Coasts,
W74-03695 8B

WAVE ENERGY
Dynamic Characteristics of West Florida Gulf Coast Beaches,
W74-03437 2J

The Generation of Edge Waves by Cylindrical Waves Impinging From the Outer Sea,
W74-03451 2E

A Model Study of the Entrance Channel Depoe Bay, Oregon,
W74-03614 8B

WAVE FRONTS
On Singular Boundary Value Problems for the EPD Equation,
W74-03617 2E

WAVE HEIGHT
Beach Cusps: Response to Plateau's Rule,
W74-03460 2J

A Possibility of Generation of Surf Beats,
W74-03681 8B

A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

Wave Decaying Due to Breaking,
W74-03683 8B

WAVE RUNUP
Wave Runup on Vertical Cylinders,
W74-03372 8B

Runup Recipe for Periodic Waves on Uniformly Sloping Beaches,
W74-03686 8B

WAVE SPECTRA
Response Characteristics of Underwater Wave Guide,
W74-03677 8B

WAVE SPECTRUM
The Spectral Structure of Waves in the Nearshore Zone,
W74-03448 2L

WAVE THEORY
Wind-Driven Waves,
W74-03673 2E

WAVE TRANSFORMATION
Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

Wave Decaying Due to Breaking,
W74-03683 8B

Transformation of Surges,
W74-03687 8B

WAVES (WATER)
Numerical Calculation of Wave Refraction Digital Computer,
W74-03343 8B

Effects of Particle Size and Wave State on Grain Dispersion,
W74-03344 2L

Maximum Breaker Height for Design,
W74-03363 8B

Suspended Sediment and Longshore Sediment Transport Data Review,
W74-03368 2J

Wave Runup on Vertical Cylinders,
W74-03372 8B

The Relationships Between Wind Records, Energy of Longshore Drift, and Energy Balance Off the Coast of a Restricted Body of Water, As Applied to the Baltic,
W74-03431 2J

Wave Set-Up on a Beach,
W74-03432 2E

Spectral Analysis of Shallow Water Waves in Lake Michigan,
W74-03439 2H

Series Solutions for Shallow Water Waves,
W74-03440 2E

Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

The Spectral Structure of Waves in the Nearshore Zone,
W74-03448 2L

Falling Water Level Ripple Marks,
W74-03449 2L

The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

The Generation of Edge Waves by Cylindrical Waves Impinging From the Outer Sea,
W74-03451 2E

Water Waves From Underwater Explosions in Shallow Water, Part I: A Mathematical Model for Waves in Constant Depth and in Shoaling Water,
W74-03454 2L

The Effect of Currents on the Mass Transport of Progressive Water Waves,
W74-03455 2L

Beach Cusps: Response to Plateau's Rule,
W74-03460 2J

Topographic Changes in the Surf Zone Profile,
W74-03609 2J

Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

Pilot Model Study for the Design of Hilo Harbor Tsunami Model. Hydraulic Model Investigation,
W74-03613 8B

A Model Study of the Entrance Channel Depoe Bay, Oregon,
W74-03614 8B

Long Wave Study of Monterey Bay,
W74-03615 2L

Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

On Singular Boundary Value Problems for the EPD Equation,
W74-03617 2E

Approach of Tides to the Hawaiian Islands,
W74-03620 2E

Longshore Currents and Nearshore Topographies,
W74-03627 2E

Conversion System for Providing Useful Energy from Water Surface Motion,
W74-03669 8C

Wind-Driven Waves,
W74-03673 2E

Numerical Calculation of Wind Waves in Shallow Water,
W74-03675 8B

Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

Wave Boundary Layers and Friction Factors,
W74-03678 8B

Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

Diffraction of Wind Generated Water Waves,
W74-03680 8B

A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

Wave Decaying Due to Breaking,
W74-03683 8B

Shock Pressure of Breaking Wave,
W74-03684 8B

The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

WAVES (WATER)

Runup Recipe for Periodic Waves on Uniformly Sloping Beaches,
W74-03686 8B

Transformation of Surges,
W74-03687 8B

On a Coexistence System of Flow and Waves,
W74-03688 8B

Model Studies of Impulsively-Generated Water Waves.
W74-03689 8B

Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

Model Study on the Filling-Up of a Fishery Harbor by Drifting Sand,
W74-03691 2L

A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

Equilibrium Flow Areas of Tidal Inlets on Sandy Coasts,
W74-03695 8B

Suspended Sediment in a Tidal Estuary,
W74-03696 2L

Mathematical Simulation of Bottom Sediment Motion by Waves,
W74-03698 2J

Proceedings of Tenth Conference on Coastal Engineering, Tokyo, Japan, September, 1966. Volume II.
W74-03699 8B

Shore Protection on the Coast of 'Yaizu',
W74-03700 8B

Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

WEATHER PATTERNS

A Multispectral Study of an Extratropical Cyclone with Nimbus 3 Medium Resolution Infrared Radiometer Data,
W74-03349 2B

WEATHERING

Oxygen and Carbon Isotope Compositions of Altered Carbonates from the Western Pacific, Core 53.0, Deep Sea Drilling Project,
W74-03352 2J

WELFARE (ECONOMICS)

Coming to Terms with Growth and the Environment,
W74-03465 6B

WELLS

Installation of Underwater Pollution Apparatus,
W74-03661 5G

WEST GERMANY

Heavy Metals in the Sediments of the Danube, Ems, Weser and Elbe Rivers in West Germany, (In German),
W74-03552 5B

WEST VIRGINIA

Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam, and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

A Bill to Provide for the Conversion of Dam Numbered 3 on the Big Sandy River in Kentucky.
W74-03389 6E

Dam Control Act.
W74-03735 6E

Ohio River Valley Water Sanitation Commission.
W74-03736 6E

WETLANDS

Conservation-Open Space Plan; Amendments to the Springfield Comprehensive Plan.
W74-03634 3D

Metropolitan Development Guide: Protection Open Space--Policy Plan, Program.
W74-03635 6G

The River of Grass is Drying Up,
W74-03718 6G

Department of Natural Resources--Divisions.
W74-03728 6E

WHEAT PRODUCTION

The Significance of the Fallow Year in the Dry-Farming System of the Great Konya Basin, Turkey,
W74-03605 3F

WHITE SUCKER

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1969 to January 31, 1970,
W74-03270 8I

WHITECAPS (WAVES)

Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

WILDLIFE MANAGEMENT

The Imperiled Everglades,
W74-03720 6G

WILT

Edaphic Factors and Wilt of Coriander,
W74-03281 5C

WIND GENERATED WAVES

Diffraction of Wind Generated Water Waves,
W74-03680 8B

WIND PRESSURE

Wind Driven Water Currents,
W74-03619 8B

WIND SLICKS

Surface Characteristics of Windrows,
W74-03618 2L

WIND TIDES

Beach Changes, on the Central Texas Coast Associated with Hurricane Fern, September, 1971,
W74-03433 2J

Survey of Gulf Coast Structural Damage Resulting from Hurricane Camille, August 1969,
W74-03623 8B

WIND VELOCITY

Beach Changes, on the Central Texas Coast Associated with Hurricane Fern, September, 1971,
W74-03433 2J

WIND WAVES

Spectral Analysis of Shallow Water Waves in Lake Michigan,
W74-03439 2H

Wind-Driven Waves,
W74-03673 2E

Numerical Calculation of Wind Waves in Shallow Water,
W74-03675 8B

Diffraction of Wind Generated Water Waves,
W74-03680 8B

WINDROWS

Surface Characteristics of Windrows,
W74-03618 2L

WINDS

Coastal Surface Currents Around New Zealand,
W74-03458 2E

Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

Surface Characteristics of Windrows,
W74-03618 2L

Approach of Tides to the Hawaiian Islands,
W74-03620 2E

WISCONSIN

Floodplain Lands for Parks and Recreation: A Case Study of Milwaukee,
W74-03491 6B

Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

WYOMING

The Wyoming Framework Water Plan, A Summary.
W74-03742 6B

YAZOO RIVER TRIBUTARY (MISS)

Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

YORK RIVER

The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

Larvae of the Burrowing Shrimp, Upogebia Affinis, (Crustacea, Decapoda, Upogebiidae) from Virginia Plankton,
W74-03303 2L

YUGOSLAVIA
The Chironomids of the Periphyton in the Yugoslav Part of the River Danube (Die Chironomidenfauna aus dem Periphyton in der jugoslawischen Donaustrecke),
W74-03562 5A

ZOEAE
Larvae of the Burrowing Shrimp, Upogebia Affinis, (Crustacea, Decapoda, Upogebiidae) from Virginia Plankton,
W74-03303 2L

Mud Shrimp (Callianassa) Larvae (Crustacea, Decapoda, Callianassidae) from Virginia Plankton,
W74-03307 2L

ZOOPLANKTON
Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

Larvae of the Burrowing Shrimp, Upogebia Affinis, (Crustacea, Decapoda, Upogebiidae) from Virginia Plankton,
W74-03303 2L

Mud Shrimp (Callianassa) Larvae (Crustacea, Decapoda, Callianassidae) from Virginia Plankton,
W74-03307 2L

Comparative Ecology and Zooplankton of Two Maryland Ponds Including a Congeneric Occurrence of Diaptomus (Calanoida: Copepoda),
W74-03308 5C

A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

AUTHOR INDEX

ABERBACH, S. H.
Artificial Recharge of Coastal-Plain Aquifer in Israel,
W74-03356 4B

ACREE, E. H.
Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

ADAMS, M. S.
Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

AHRENS, J. P.
A Model Study of the Entrance Channel Depoe Bay, Oregon,
W74-03614 8B

AIBA, S.
Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

AKIYA, T.
Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

ALAGARSAMY, S. R.
Conventional Treatment Methods for Pulp and Paper Mill Wastes and Disposal on Land for Irrigation,
W74-03547 5D

Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

ALLARDICE, D.
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

ALLERSMA, E.
Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

ALOIA, R. C.
Sterile Culture Techniques for Species of the Rotifer Asplanchna,
W74-03316 5A

ALQUIST, H. E.
Containing and Removing Oil Spills on Water,
W74-03670 3A

ALTINBILEK, H. D.
Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

ANDERSON, T. F.
Oxygen and Carbon Isotope Compositions of Altered Carbonates from the Western Pacific, Core 53.0, Deep Sea Drilling Project,
W74-03352 2J

ANDREN, A. W.
Methylmercury in Estuarine Sediments,
W74-03602 5B

ANDREWS, A. K.
Distribution and Community Relationships of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03263 8I

The Life History of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03268 8I

ANGELL, C. A.
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

AOYAMA, K.
Ecological Studies on Dissolved Oxygen and Bloom of Microcystis in Lake Suwa: I. Horizontal Distribution of Dissolved Oxygen in Relation to Drifting of Microcystis by wind,
W74-03524 5C

ARAMAKI, M.
A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

ARNOLD, R.
The Substantive Right to Environmental Quality Under the National Environmental Policy Act,
W74-03384 6E

ARNOLD, W. III
Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

AURAND, D.
Nitrate and Nitrite in the Surface Waters of Two Delaware Salt Marshes,
W74-03538 5B

AVSYUK, G. A.
Fifth All-Union Symposium on Glaciology (O pyatom obshchesoyuznom glyatsiologicheskom simpoziume),
W74-03260 2C

AYERS, R. R.
Sorbent Belt,
W74-03672 5G

AZAM, F.
Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

BAINES, W. D.
Wind Driven Water Currents,
W74-03619 8B

BAKER, S. E.
Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

BALSILLIE, J. H.
State of Groin Design and Effectiveness,
W74-03370 8A

BANAT, K.
Heavy Metals in the Sediments of the Danube, Ems, Weser and Elbe Rivers in West Germany, (In German),
W74-03552 5B

BARKALOVA, N. G.
Some Data on Fluorine, Bromine, and Iodine Concentrations in Atmospheric Precipitation at Voronezh (Nekotoryye dannyye o soderzhanii ftora, broma i ioda v atmosfernykh osadkakh g. Voronezha),
W74-03251 5A

BARKER, J. C.
The Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W74-03339 5B

BARKLEY, P. W.
Economic Growth and Environmental Decay: The Solution Becomes the Problem,
W74-03492 6B

BARNES, G. H.
Environmental Law - Water Pollution Remedies - Use of Public Nuisance Theory in Suit by Federal Government - United States V. Ira S. Bushey and Sons, Inc.,
W74-03381 5G

BARR, F. J. JR
Feasibility Study of a Seismic Reflection Monitoring System for Underground Waste-Material Injection Sites,
W74-03230 5B

BARRACLOUGH, J. T.
Radioactive- and Chemical-Waste Transport in Groundwater at National Reactor Testing Station, Idaho: 20-Year Case History and Digital Model,
W74-03233 5B

BARTEL, C. F. JR
Circuit for Water Depth Meter,
W74-03666 7B

BARTLETT, E. M.
Physiology of Drought Resistance in the Soybean Plant (Glycine max): I. The Relationship Between Drought Resistance and Growth,
W74-03475 3F

BATES, C. T.
Reservoirs and Local Government Finance,
W74-03748 6B

BATTARBEE, R. W.
A New Method for the Estimation of Absolute Microfossil Numbers, with Reference Especially to Diatoms,
W74-03285 5A

BAUGHMAN, G. L.
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

BELK, D.
Streptocephalus Moorei N. Sp., a New Fairy Shrimp (Anostraca) From Mexico,
W74-03319 2I

BELYAYEV, I. P.
Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bug-

BELYAYEV, I. P.

skogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

BERG, D. W.
State of Groin Design and Effectiveness,
W74-03370 8A

Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

BEROV, M. B.
pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

BERRIOS, A. T.
Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

BHALERAO, B. B.
Conventional Treatment Methods for Pulp and Paper Mill Wastes and Disposal on Land for Irrigation,
W74-03547 5D

Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

BIJKER, E. W.
Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

BILLINGS, G. K.
Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

BIRGE, W. J.
Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of Water Quality,
W74-03206 5C

BISHOP, W. M.
Engineering Design Criteria for Spray Irrigation,
W74-03521 5D

BISWAS, A. K.
Socio-Economic Considerations in Water Resources Planning,
W74-03745 6B

BLACKBURN, M.
Regressions Between Biological Oceanographic Measurements in the Eastern Tropical Pacific and Their Significance to Ecological Efficiency,
W74-03559 5B

BLAKELY, C. P.
Instrumentation for Water Pollution Monitoring,
W74-03640 5D

BOCH, A. L.
Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

BOND, D. C.
Deduction of Flow Patterns in Variable-Density Aquifers from Pressure and Water-Level Observations,
W74-03236 4B

BOON, J. D. III
An Inexpensive, Fast Response Current Speed Indicator,
W74-03310 7B

BOUWER, H.
Design and Operation of Land Treatment Systems for Minimum Contamination of Groundwater,
W74-03223 5D

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

BOWIE, A. J.
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

BOYER, H.
Recycling on the Land: An Alternative for Water Pollution Control,
W74-03387 5D

BOYLEN, C. W.
Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

BOYNAGRYAN, V. R.
Dynamics and Morphology of the Sambian Peninsula,
W74-03462 2J

Morphometric Analysis of Short-Period Changes in the Topography of the Shore,
W74-03341 2J

BOYNTON, W. R.
Standing Crop of Salt Marshes Surrounding Chincoteague Bay, Maryland-Virginia,
W74-03304 2L

BRADLEY, J. R.
The Economic Impact of a Deepwater Terminal in Texas,
W74-03489 6B

BRAGG, D. M.
The Economic Impact of a Deepwater Terminal in Texas,
W74-03489 6B

BRANDSTETTER, A.
A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

BRASHEAR, H. R.
Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

BRAUNE, W.
In Situ Experimental Investigations of the Biomass Production of Micro-Algae and of Natural Algal Biocoenoses in Flowing Waters, (In German),
W74-03598 5C

BREADEN, J. P.
The Generation of Flood Damage Time Sequences,
W74-03334 4A

BRECHT, W.
Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

BREMNER, J. M.
Is Phosphate Reduced to Phosphine in Waterlogged Soils,
W74-03523 2G

BREWER, J. W.
Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

BROCHET, P.
A Practical Method of Calculating Potential Evapotranspiration, (In French),
W74-03721 2D

BROCK, T. D.
Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

BRODIE, J. W.
Coastal Surface Currents Around New Zealand,
W74-03458 2E

BROKL, M.
Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

BROOKS, J. D.
The Effect of Discontinuous Methanol Addition on the Growth of a Carbon-Limited Culture of Pseudomonas,
W74-03584 5C

BROOKS, N. H.
Dispersion in Hydrologic and Coastal Environments,
W74-03327 5B

BROWN, D. L.
Underground Storage and Retrieval of Fresh Water from A Brackish-Water Aquifer,
W74-03237 4B

BROWN, R. F.
Artificial Recharge--State of the Art,
W74-03354 4B

Role of Borehole Geophysics in Underground Waste Storage and Artificial Recharge,
W74-03229 5E

BRUNGS, W. A.
Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

BRYAN, G. W.
Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

BRYANT, R. D.
Treatment of Domestic Sewage at Offshore Locations,
W74-03221 5D

BURBANK, N. C. JR
Virus Removal in Hawaiian Soils,
W74-03293 5F

BURDGE, R. J.
Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

BURFORD, J. R.
Is Phosphate Reduced to Phosphine in Waterlogged Soils,
W74-03523 2G

BURGUET, J. E.
Look, No Clarifier,
W74-03220 5F

BURSZTYNSKY, T. A.
In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

BUSSON, G.
Importance of Diatoms in the Present Varve Deposition (Alternation of Annual Layers) of Green Lake (Near Fayetteville, N.Y.), Model of Confined Sedimentation, (In French),
W74-03577 2H

BUTTGEREIT, G.
Modified Atomic Absorption Spectroscopic Methods in Analyses of Trace Metals (Modifizierte atomabsorptionsspektroskopische Methoden zur Metallspuren-Analytik),
W74-03586 5A

BYRNE, R. J.
An Inexpensive, Fast Response Current Speed Indicator,
W74-03310 7B

CALDWELL, D. H.
Upgrading Lagoons,
W74-03495 5D

CAMERON, I. L.
Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

CANALE-PAROLA, E.
Glucose and Pyruvate Metabolism of Spirochaeta litoralis, an Anaerobic Marine Spirochete,
W74-03600 5B

CAROTHER, H. P.
Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

CARPENTER, M. R.
Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1968 to June 30, 1969,
W74-03269 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1969 to January 31, 1970,
W74-03270 8I

CARPENTER, W. L.
Recent Studies of Mercury Analysis Procedures for Mill Effluents,
W74-03542 5A

CARRIER, G. F.
The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

CARSTENS, M. R.
Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

CARSTENS, T.
Hydraulic Survey and Model Investigation of the Inner Rana Fjord,
W74-03701 2L

CARTER, J. W.
Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

CASE, F. N.
Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

CEARLOCK, D. B.
A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

CHAMBERS, W. J.
Limestone Springs and Individual Flood Events, (With Special Reference to the Gower Peninsula, Wales),
W74-03512 2F

CHAN, H. L.
Backscattering from a Two-Scale Rough Surface with Application to Radar Sea Return,
W74-03509 7B

CHARLES, C. O.
Minimum Cost Design of Water Distribution Systems,
W74-03205 8A

CHAU, Y. K.
Complexing Capacity of Natural Water - Its Significance and Measurement,
W74-03578 5A

CHERRY, J. A.
Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

CHILDERS, T. W.
Installation of Underwater Pollution Apparatus,
W74-03661 5G

CLESCERI, N. L.
Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

CLIFFORD, M. J.
Hydrodynamics of Mount Simon Sandstone, Ohio and Adjoining Areas,
W74-03235 5B

CLISTER, W. E.
Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

CLOUD, P. E. JR
Beach Cusps: Response to Plateau's Rule,
W74-03460 2J

COLEMAN, J. M.
Recent Coastal Sedimentation: Central Louisiana Coast,
W74-03345 2L

COLLAZO, J.
Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

COLLINS, G. B.
An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

COLLINS, J. I.
The Effect of Currents on the Mass Transport of Progressive Water Waves,
W74-03455 2L

COLUMBUS, N.
Dan Region, Israel, Sewage-Reclamation and Recharge Project,
W74-03359 5D

CONNELL, M. U.
The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

COOTE, D. R.
A Conveniently Constructed Divisor for Splitting Low Water Flows,
W74-03522 7B

COULTER, J. R.
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

COURCHENE, J.
Emphasizing Quality Control,
W74-03636 5F

COVENTRY, R. J.
Structure and Texture of a Gravelly Barrier Island in the Fitzroy Estuary, Western Australia, and the Role of Mangroves in the Shore Dynamics,
W74-03351 2L

COWAN, P. A.
Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

CRANE, J. D.
In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

CREMER, K. W.
Immediate Resumption of Growth by Radiata Pine After Five Months of Minimal Transpiration During Drought,
W74-03519 2D

CRISEWELL, M. E.
Survey of Gulf Coast Structural Damage Resulting from Hurricane Camille, August 1969,
W74-03623 8B

CRISTEA-NASTASESCU, M.
Observations on the Ecology and Distribution of the Turbellarian Fauna of the Danube Delta (Beobachtungen uber die Okologie und Verbreitung der Turbellarienfauna im Donaudelta),
W74-03574 5C

CROSBY, D. G.
Photodecomposition of P-Chlorophenoxyacetic Acid,
W74-03583 5B

Photodecomposition of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) in Water,
W74-03585 5B

CUMMINS, R. S.
Survey of Gulf Coast Structural Damage Resulting from Hurricane Camille, August 1969,
W74-03623 8B

CZARNECKI, D. B.
Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

DAIBER, F. C.
Nitrate and Nitrite in the Surface Waters of Two Delaware Salt Marshes,
W74-03538 5B

DALPKE, H. L.
Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

DAS, M. M.
Suspended Sediment and Longshore Sediment Transport Data Review,
W74-03368 2J

DAVID, E. J.
Biodegradation of Urea in River Waters Under Controlled Laboratory Conditions,
W74-03287 5B

DAVID, E. J. L.
Floodplain Lands for Parks and Recreation: A Case Study of Milwaukee,
W74-03491 6B

DAVIS, D. J.
The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

DAVIS, E. M.
Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

DAVIS, R. A. JR
Beach Changes, on the Central Texas Coast Associated with Hurricane Fern, September, 1971,
W74-03433 2J

DAY, H. J.
Recreational Demand at Lakes and Reservoirs,
W74-03480 6D

DAY, J. W.
Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

DE GOEIJ, J. J. M.
Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

DEL RIO, F.
Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

DENISOVA, A. I.
Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

DEVINE, J. M.
Determination of Trichlorfon (0,0-Dimethyl (2,2,2-Trichloro-1-Hydroxyethyl)Phosphonate) in Forest Environmental Samples,
W74-03588 5A

DEVOE, I. W.
Dissociation in a Marine Pseudomonad,
W74-03566 5A

DHOPLE, A. M.
Quantitative Extraction of Adenosine Triphosphate From Cultivable and Host-Grown Microbes: Calculation of Adenosine Triphosphate Pools,
W74-03570 5A

DIETRICH, M. W.
Determination of Trace Organics in Air and Water,
W74-03576 5A

DITMARS, J. D.
Mathematical Simulation of Tidal Time-Averages of Salinity and Velocity Profiles in Estuaries,
W74-03348 2L

DITOMMASO, A.
Role of Bacteria in Decomposition of Injected Liquid Waste at Wilmington, North Carolina,
W74-03246 5B

DITORO, D. M.
Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

DOHERTY, W. A.
Water Circulation System for Fresh Water Fish Husbandry,
W74-03659 5D

DOLAN, R.
Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

DONALDSON, E. C.
History of a Two-Well Industrial-Waste Disposal System,
W74-03247 5E

DORRESTEIN, R.
Wave Set-Up on a Beach,
W74-03432 2E

DOUROS, J. D. JR
Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

DOWELL, C. L.
Dams and Reservoirs in Texas: Part II,
W74-03375 8A

DRESSMAN, R. C.
Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

DUANE, D. B.
Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

DUNLAP, W. G.
Direct Fluorescent-Antibody Technique for the Microbiological Examination of Food and Environmental Swab Samples for Salmonellae,
W74-03569 5A

DURGAPRASADA RAO, N. V. N.
Trace-Element Distribution in the Continental-Shelf Sediments off the East Coast of India,
W74-03350 2J

DYER, K. L.
An Evaluation of Water-Quality Data Obtained at Four Streamflow Daily-Record Stations in Idaho,
W74-03507 5A

EAGLESON, P. S.
Design of Optimal Precipitation Networks,
W74-03333 2B

EASTMAN, P.
Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam, and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

EGOROVA, V. N.
Life Cycle of Orchardgrass (Dactylis glomerata L.) in the Flood Meadows of the Oka River: I, (In Russian),
W74-03604 2I

EISENMANN, R.
Method for Purifying Water,
W74-03652 5D

ELKAN, G. H.
Role of Bacteria in Decomposition of Injected Liquid Waste at Wilmington, North Carolina,
W74-03246 5B

ELY, H.
The Draft United Nations Convention on the International Seabed Area - American Bar Association Position,
W74-03377 6E

EMERY, R. M.
Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

ENGEL, R. L.
A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

EPPLEY, R. W.
A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

EVANS, W. H.
Biodegradation of Urea in River Waters Under Controlled Laboratory Conditions,
W74-03287 5B

EZZAT, A.
Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

FAIRCHILD, J. C.
Longshore Transport of Suspended Sediment,
W74-03369 2J

FAN, L-S.
Pollution Control and the Behavior of the Firm--A Technical Note,
W74-03749 5G

FAULKNER, G. L.
Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

FEDOROWICZ, Z.
Methods of the Calculation of Cost-Benefit in the Construction of Seaports,
W74-03464 6B

FERRELL, R. E. JR
Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

FINCHER, E. L.
Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

FISHELSON, G.
The Optimal Time to Start the Operation of a Desalting Plant in Israel,
W74-03750 3A

FISHER, J. S.
Mathematical Simulation of Tidal Time-Averages of Salinity and Velocity Profiles in Estuaries,
W74-03348 2L

FISHER, L. J.
Preliminary Results and Comparison of Dye Tracer Studies Conducted in Harbors, Estuaries, and Coastal Waters,
W74-03705 5B

FISHER, R. P.
An Investigation of Atomic Absorption Analysis of Mill Effluent Metal Ion Content,
W74-03543 5A

FISHER, W. F.
Comparison of Field and Sigma-Inductive Models for the Transmission of Nonconjugative Substituent Effects. The 2,6-Spiro (3,3) Heptyl System,
W74-03737 2K

FLICKINGER, S. A.
Construction of Experimental Bait Fish Culture Ponds,
W74-03264 8I

Determine the Present Volume and Value of Bait Fish Sales by Species in Colorado and Adjacent Mountain States,
W74-03262 8I

Growth and Mortality of the Fathead Minnow as Related to Population Density in Production Ponds,
W74-03265 8I

Lake Distribution in Colorado and Community Relationships of the Fathead Minnow in Two Lake Populations,
W74-03266 8I

Rearing Bait Fishes in the Rocky Mountain States,
W74-03261 8I

Selection of the Optimum Brood Fish Density and Sex Ratios of the Fathead Minnow (Pimephales Promelas) under Prescribed Spawning Conditions,
W74-03267 8I

FOERSTNER, U.
Heavy Metals in the Sediments of the Danube, Ems, Weser and Elbe Rivers in West Germany, (In German),
W74-03552 5B

FONSELIUS, S. H.
Stagnant Sea,
W74-03712 5C

FONTANE, D. G.
Mathematical Modeling of Water Quality,
W74-03217 5B

FORDYCE, H. E.
Hyperbolic Cross Flow Cooling Tower with Basins and Fill Integrated into Shell,
W74-03668 5D

FORSTE, R. H.
Verification of Groundwater Capital Costs,
W74-03338 4B

FRETTER, V.
Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

FROEHLICH, B. R.
Pollution Control and the Behavior of the Firm--A Technical Note,
W74-03749 5G

FUKUCHI, T.
Shore Protection on the Coast of 'Yaizu',
W74-03700 8B

FUKUSHIMA, H.
Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

FULWYLER, M. J.
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

FUNG, A. K.
Backscattering from a Two-Scale Rough Surface with Application to Radar Sea Return,
W74-03509 7B

A Non-Coherent Model for Microwave Emissions and Backscattering from the Sea Surface,
W74-03510 7B

GALLAGHER, R. M.
Preliminary Report on the Hydrography of the Pensacola Bay Estuary, Florida,
W74-03347 2L

GALVIN, C. J.
Wave Runup on Vertical Cylinders,
W74-03372 8B

GALVIN, C. J. JR
A Gross Longshore Transport Rate Formula,
W74-03367 2J

GANAPATI, P. N.
Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

GANNON, J. E.
A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

GARCIA, N. L.
Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

GARRETT, C.
Tidal Resonance in the Bay of Fundy and Gulf of Maine,
W74-03434 2L

GATES, L. F.
Effects of Reducing Interplant Competition for Light and Water on Stalk Rot of Corn,
W74-03516 3F

GEODAKYAN, R. O.
The Formation of Phytocenoses on the Liberated Ground of Lake Sevan, (In Russian),
W74-03632 2H

GERBIER, N.
A Practical Method of Calculating Potential Evapotranspiration, (In French),
W74-03721 2D

GILL, A. C.
Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

GINSBURG, W.
Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

GLORIOD, T. L.
Multiple Outlet Selective Withdrawal Technique for Water Quality Prediction of Lake Releases,
W74-03218 5B

GOLDBECK, C. G.
Titrimetric Determination of Uranium with Electrogenerated Vanadium (V),
W74-03564 2K

GOLDMAN, J. C.
Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

GOLDMAN, R. S.
Note, Access to Public Municipal Beaches: The Formulation of a Comprehensive Legal Approach,
W74-03380 6E

GOLE, C. V.
Salinity Distribution and Effect of Fresh Water Flows in the Hooghly River,
W74-03702 2L

GOMBERG, M. L.
Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

GOOLSBY, D. A.
Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

GORDON, J. A.
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

GORSLINE, D. S.
Dynamic Characteristics of West Florida Gulf Coast Beaches,
W74-03437 2J

GOSS, D. W.
Movement and Accumulation of Suspended Sediment During Basin Recharge,
W74-03240 4B

GOULD, M.
Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

GOW, J. A.
Dissociation in a Marine Pseudomonad,
W74-03566 5A

GOZLAN, R. S.
Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

GRACIA-BENGOCHEA, J. I.
Artificial Recharge of Treated Waste Waters and Rainfall Runoff into Deep Saline Aquifers of Peninsula of Florida,
W74-03242 5E

GRAEFE, V.
Approach of Tides to the Hawaiian Islands,
W74-03620 2E

GRAYMAN, W. M.
Design of Optimal Precipitation Networks,
W74-03333 2B

GREEN, H. P.
The Resolution of Uncertainty,
W74-03479 5G

GREEN, W. J.
Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

GREENE, G. H.
Comparison of Field and Sigma-Inductive Models for the Transmission of Nonconjugative Substituent Effects. The 2,6-Spiro (3,3) Heptyl System,
W74-03737 2K

GRIMA, A. P. LINO
The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

GRISAK, G. E.
Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

GRUENDLING, G. K.
Toxicity of Lead Nitrate to Algae,
W74-03595 5C

GRUPPUSO, P. A.
DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

GUILBE, A.
Comparative Analysis of Residential Water Use in Puerto Rico,
W74-03324 6D

HAIMES, Y. Y.
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

HALLERMEIER, R. J.
Wave Runup on Vertical Cylinders,
W74-03372 8B

HALLIWELL, A. R.
Suspended Sediment in a Tidal Estuary,
W74-03696 2L

HANBY, K. P.
Subsurface Disposal of Liquid Industrial Wastes in Alabama--A Current Status Report,
W74-03227 5E

HANEY, J. F.
An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

HANKS, J. H.
Quantitative Extraction of Adenosine Triphosphate From Cultivable and Host-Grown Microbes: Calculation of Adenosine Triphosphate Pools,
W74-03570 5A

HANSON, T. L.
Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

HARNETT, J. P.
Compost for Removing Oil Films from Water,
W74-03658 5D

HARRIS, R. F.
Potential of an Eroding Urban Soil for the Phosphorus Enrichment of Streams: I. Evaluation of Methods,
W74-03438 5B

HARRIS, R. L.
Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

HARRISS, R. C.
Methylmercury in Estuarine Sediments,
W74-03602 5B

HAUGEN, J. C.
Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

HAWKINS, A. S.
Waterfowl Habitat Trends in the Aspen Parkland of Manitoba,
W74-03517 4C

HAWLEY, E. F.
Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

HAYANO, S.
Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

HEATH, R. C.
Feasibility Study of Liquid-Waste Injection into Aquifers Containing Salt Water, Wilmington, North Carolina,
W74-03362 5E

HEBERT, G. G.
Treatment of Domestic Sewage at Offshore Locations,
W74-03221 5D

HELLDEN, U.
Some Calculations of the Denudation Rate in a Dolomitic Limestone Area at Isfjord-Radio, West-Spitzbergen,
W74-03514 2J

HELLER, W. W.
Coming to Terms with Growth and the Environment,
W74-03465 6B

HEMMINGSEN, B. B.
Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

HENDERSON, J. S.
Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

HENNEMAN, K. R.
Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

HERBICH, J. B.
Numerical Calculation of Wave Refraction Digital Computer,
W74-03343 8B

HERRON, W. J.
Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

HERRON, W. J. JR
Case History of Mission Bay Inlet, San Diego, California,
W74-03366 8B

HESPELL, R. B.
Glucose and Pyruvate Metabolism of Spirochaeta litoralis, an Anaerobic Marine Spirochete,
W74-03600 5B

HIEBERT, R. D.
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

HIGUCHI, H.
Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

HINO, K.
Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

HINO, M.
Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

HITES, R. A.
Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

HOEKSTRA, A. J.
Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

HOFFMAN, T. W.
Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

HOFMANN, H. A.
The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

HOGAN, C. M.
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

HOLGUIN, O. V.
Castaic Lake Area Recreation Development Plan,
W74-03481 6B

HOLMQUIST, C.
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

HOLUB, R.
A Multispectral Study of an Extratropical Cyclone with Nimbus 3 Medium Resolution Infrared Radiometer Data,
W74-03349 2B

HOM-MA, M.
Response Characteristics of Underwater Wave Guide,
W74-03677 8B

HORIKAWA, K.
Response Characteristics of Underwater Wave Guide,
W74-03677 8B

A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

HORNEY, J. L.
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

HOUSLEY, J. G.
Pilot Model Study for the Design of Hilo Harbor Tsunami Model. Hydraulic Model Investigation,
W74-03613 8B

HSU, P. H.
Removal of Phosphate from Waste Water by Aluminum and Iron, Phase III,
W74-03208 5D

HUCKSTEDT, G.
Method and Apparatus for Purifying Sea Water,
W74-03654 3A

HUGHES, J. L.
Effects of Waste Percolation of Groundwater in Alluvium Near Barstow, California,
W74-03228 5E

HULKA, S. C.
Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

HUMMERSTONE, L. G.
Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

HUNN, J.
Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

HUNT, I. A. JR
Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

HUSSEINI, F. F.
Iodine Treated Activated Carbon and Process of Treating Contaminated Water Therewith,
W74-03651 5D

HUTSON, M. R.
Look, No Clarifier,
W74-03220 5F

ICHIKI, M.
Method of Separating Metals from Waste Water,
W74-03664 5D

IDYLL, C. P.
The Anchovy Crisis,
W74-03473 6C

Farming the Sea,
W74-03717 8I

IJIMA, T.
Numerical Calculation of Wind Waves in Shallow Water,
W74-03675 8B

IMON, S.
Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

INMAN, D. L.
Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

INSALATA, N. F.
Direct Fluorescent-Antibody Technique for the Microbiological Examination of Food and Environmental Swab Samples for Salmonellae,
W74-03569 5A

IPPEN, A. T.
Mathematical Simulation of Tidal Time-Averages of Salinity and Velocity Profiles in Estuaries,
W74-03348 2L

ISHII, M.
Method of Separating Metals from Waste Water,
W74-03664 5D

ISOZAKI, I.
A Possibility of Generation of Surf Beats,
W74-03681 8B

ISRAELI, E.
Production of Bacteriophage by Lyophilized and Oxygen-Exposed Escherichia coli,
W74-03575 5A

IVANOVA, A. A.
Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

IWAGAKI, Y.
Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

JAKOBS, H.
Method and Apparatus for Purifying Sea Water,
W74-03654 3A

JANKOVIC, D.
Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

JANKOVIC, M.
The Chironomids of the Periphyton in the Yugoslav Part of the River Danube (Die Chironomidenfauna aus dem Periphyton in der jugoslawischen Donaustrecke),
W74-03562 5A

JANNASCH, H. W.
Dissimilatory Reduction of Inorganic Sulfur by Facultatively Anaerobic Marine Bacteria,
W74-03597 5C

JANSSEN, B. H.
The Significance of the Fallow Year in the Dry-Farming System of the Great Konya Basin, Turkey,
W74-03605 3F

JAQUITH, J. H.
The California State Water Project in 1968,
W74-03502 6B

JARMAN, J. W.
Coastal Applications of the ERTS-A Satellite,
W74-03374 2J

JEDLICKA, C. L.
Nomographs for Thermal Pollution Control Systems,
W74-03329 5D

JEFFRIES, H. P.
The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism,
W74-03626 5C

JENDEN, D. J.
A Multiple Specific Ion Detector and Analog Data Processor For a Gas Chromatograph Quadrupole Mass Spectrometer System,
W74-03580 2K

JENNINGS, J. N.
Structure and Texture of a Gravelly Barrier Island in the Fitzroy Estuary, Western Australia, and the Role of Mangroves in the Shore Dynamics,
W74-03351 2L

JOHANSEN, R. T.
History of a Two-Well Industrial-Waste Disposal System,
W74-03247 5E

JOHNSON, H. P.
Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

JOHNSON, K. S.
Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

JONES, J. M.
The Microcalorimetry of Microbial Growth,
W74-03273 5A

JONES, O. R.
Movement and Accumulation of Suspended Sediment During Basin Recharge,
W74-03240 4B

JONES, R. H.
In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

JONSSON, I. G.
Wave Boundary Layers and Friction Factors,
W74-03678 8B

JORDAAN, J. M. JR
Model Studies of Impulsively-Generated Water Waves.
W74-03689 8B

JOYCE, R. T.
Monitoring Nutrient Losses from Small Watersheds,
W74-03219 5B

JUDGE, C. W.
Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

JUST, J. J.
Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of Water Quality,
W74-03206 5C

KAKINUMA, T.
Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

KAMPHUIS, J. W.
Mathematical Simulation of Bottom Sediment Motion by Waves,
W74-03698 2J

KANAAN, G. E.
Recreational Demand at Lakes and Reservoirs,
W74-03480 6D

KASHIWAMURA, M.
Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

KATAGUE, D. B.
Characterization and Microdetermination of a Water-Soluble Metabolite from Bladex Herbicide by Conversion to 5,5-Dimethylhydantion,
W74-03587 5A

KAUFMAN, M. I.
Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

KAZMANN, R. G.
Saline Aquifers--Future Storage Reservoirs for Fresh Water,
W74-03224 5E

KEEFE, C. W.
Standing Crop of Salt Marshes Surrounding Chincoteague Bay, Maryland-Virginia,
W74-03304 2L

KEEN, S. R.
Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

KENNEDY, J. F.
Depositional Behavior of Fine Sediment in a Turbulent Fluid Motion,
W74-03697 2J

KENNEDY, J. O.
The Influences of an Urban Area and a Reservoir on Benthic Macroinvertebrate Production in the Des Moines River, Iowa,
W74-03209 5C

KERST, A. F.
Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

KESTNER, F. J. T.
The Effects of Water Conservation Works on the Regime of Morecambe Bay,
W74-03483 4A

The Old Coastline of the Wash,
W74-03435 2L

KEYS, W. S.
Role of Borehole Geophysics in Underground Waste Storage and Artificial Recharge,
W74-03229 5E

KHAN, R. A.
Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

KHANNA, S. D.
Effects of Highways on Surface and Subsurface Waters,
W74-03607 4C

KHARAKA, Y. K.
Retention of Dissolved Constituents of Waste by Geologic Membranes,
W74-03238 5B

KIDD, R. E.
Subsurface Disposal of Liquid Industrial Wastes in Alabama--A Current Status Report,
W74-03227 5E

KIEL, W. H. JR
Waterfowl Habitat Trends in the Aspen Parkland of Manitoba,
W74-03517 4C

KILMER, V. J.
Monitoring Nutrient Losses from Small Watersheds,
W74-03219 5B

KIMBLER, O. K.
Effect of Formation Dip on the Movement of Fresh Water Stored in Saline Aquifers,
W74-03336 4B

Saline Aquifers--Future Storage Reservoirs for Fresh Water,
W74-03224 5E

KINNE, O.
Physiological Aspects of Animal Life in Estuaries with Special Reference to Salinity,
W74-03461 2L

KINTER, L. B.
DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

KISHI, T.
The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

KLEPESHNEV, A. M.
Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

KNAPP, D. J.
Wind Driven Water Currents,
W74-03619 8B

KOEBEL, K.
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

KOEMAN, J. H.
Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

KOMORI, S.
Response Characteristics of Underwater Wave Guide,
W74-03677 8B

KONOVALOV, G. S.
Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

KONSTANTINOVA, L. G.
Biogenic Metamorphosis of Water in Lakes of the Amu-Dar'Ya Delta (O biogennoy metamorfizatsii vody v ozerakh del'ty Amudar'i),
W74-03531 2H

KORENEVA, V. I.
Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

KORENOVSKAYA, I. M.
Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

KOTLYAKOV, V. M.
Fifth All-Union Symposium on Glaciology (O pyatom obshchesoyuznom glyatsiologicheskom simpoziume),
W74-03260 2C

KOUDSTAAL-HOL, C. H. M.
Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

KREUSCH, E. G.
Iodine Treated Activated Carbon and Process of Treating Contaminated Water Therewith,
W74-03651 5D

KRIER, J. E.
Resource Allocation, Information Cost and the Form of Government Intervention,
W74-03485 5G

KRIVOPALOVA, Z. F.
Ion Load and Carbonate Equilibrium in the Troitak Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

KRZYZANEK, E.
Bottom Macrofauna in the Goczalkowice Dam Reservoir in the Years 1965-1969,
W74-03271 5C

KU, H. F. H.
Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

KUHN, K.
Asse Salt Mine, Federal Republic of Germany--Operating Facility for Underground Disposal of Radioactive Wastes,
W74-03358 5E

KUIPER, J.
A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

KUMAR, I. J.
Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

KUO, C-T.
A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

KUWAMURA, H.
Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

KUZ'MINA, A. E.
Mass Development of Hydrurus in the Yenisei Below the Krasnoyarsk Reservoir Dam, (In Russian),
W74-03550 4A

KUZ'MINSKAYA, G. G.
The Spectral Structure of Waves in the Nearshore Zone,
W74-03448 2L

KWAPULINSKI, J.
Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

LAHUE, R.
A Sensitive Bio-Behavioral Assay for Methyl Mercury,
W74-03572 5A

LAI, R. J.
Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

LAITONE, E. V.
Series Solutions for Shallow Water Waves,
W74-03440 2E

LAMOREAUX, P. E.
Subsurface Disposal of Liquid Industrial Wastes in Alabama--A Current Status Report,
W74-03227 5E

LANCE, J. C.
Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

LANCY, L. E.
Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

LANDE, A.
Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

LARIONOVA, L. I.
Investigation of the Chemical Composition of Atmospheric Precipitation in the Vicinity of Yevpatoriya (Issledovaniye khimicheskogo sostava atmosfernykh osadkov v rayone g. Yevpatorii),
W74-03526 2K

LARSON, G. L.
A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

LATTA, B. F.
Subsurface Disposal of Waste in Kansas,
W74-03248 5E

LAU, S. C.
Characterization and Microdetermination of a Water-Soluble Metabolite from Bladex Herbicide by Conversion to 5,5-Dimethylhydantion,
W74-03587 5A

LAZO, F. I.
Readily Hydrosable Organic Matter in Bottom Sediments of Lake Baikal, (In Russian),
W74-03715 5C

LEAVELL, C. B.
Water Law of Southeastern Estuaries,
W74-03463 6E

LEAVELL, K. H.
Thermodynamics of Acid-Base Equilibria. m' and p' Hydroxybenzaldehyde,
W74-03738 2K

LEBLANC, P. J.
Review of Rapid BOD Test Methods,
W74-03557 5A

LEE, T. N.
Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

LEENHEER, J. A.
Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

LELAND, J.
User Attitudes Toward Water Quality and Price, Las Vegas Valley and Reno-Sparks, Nevada,
W74-03331 5G

LERNER, M. W.
Titrimetric Determination of Uranium with Electrogenerated Vanadium (V),
W74-03564 2K

LEUNG TACK KIT, D.
Study of a Polluted Environment (The Old Port Area of Marseilles): The Influence of Physical and Chemical Conditions on the Characteristics of the Population of the Quay, (In French),
W74-03719 5C

LEVCHENKO, V. M.
Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

LEVY, E. M.
A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

LICHTENBERG, J. J.
Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

LIKE, I.
Tuning Down the GNP,
W74-03744 6G

LIN, P. E.
Procedures for Testing the Difference of Means with Incomplete Data,
W74-03581 7C

LINDABERRY, H. L.
Control of Aquatic Plant Life,
W74-03653 4A

LINO, P.
The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

LIOTTA, C. L.
Comparison of Field and Sigma-Inductive Models for the Transmission of Nonconjugative Substituent Effects. The 2,6-Spiro (3,3) Heptyl System,
W74-03737 2K

Thermodynamics of Acid-Base Equilibria. m' and p' Hydroxybenzaldehyde,
W74-03738 2K

LIU, P. C.
Spectral Analysis of Shallow Water Waves in Lake Michigan,
W74-03439 2H

LLOYD, B.
The Construction of a Sand Profile Sampler: Its Use in the Study of the Vorticella Populations and the General Interstitial Microfauna of Slow Sand Filters,
W74-03286 5A

LOCKWOOD, M. G.
Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

LOFGREN, B. E.
Hazards of Waste Disposal in Groundwater Basins,
W74-03357 5E

LOMENICK, T. F.
Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

LONGBOTTOM, J. E.
Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

LONGEST, JAMES W.
Investigation of the Public and Private Interests in the Chesapeake Bay Area,
W74-03332 6B

LONGINOV, V. V.
The Possibility of Calculating the Sand Drift Along a Shallow-Water Coastt. II. Definition of the Basic Concepts and Terms and Formulation of the Problem of Determining the Drift,
W74-03447 2J

LORD, W. B.
Aggregates and Externalities: Information Needs for Public Natural Resource Decision-Making,
W74-03474 6B

LORENZEN, M.
Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

LOUGHRAN, E. D.
Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

LOWE, R. L.
An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

LUDLAM, S. D.
Importance of Diatoms in the Present Varve Deposition (Alternation of Annual Layers) of Green Lake (Near Fayetteville, N.Y.), Model of Confined Sedimentation, (In French),
W74-03577 2H

LUNDGREN, H.
Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

LYNCH, T. J.
Long Wave Study of Monterey Bay,
W74-03615 2L

MACK-FIRA, V.
Observations on the Ecology and Distribution of the Turbellarian Fauna of the Danube Delta (Beobachtungen uber die Okologie und Verbreitung der Turbellarienfauna im Donaudelta),
W74-03574 5C

MACKENZIE, A. P.
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

MACLEOD, R. A.
Dissociation in a Marine Pseudomonad,
W74-03566 5A

MACON, J. A.
In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

MAGOON, O. T.
Coastal Applications of the ERTS-A Satellite,
W74-03374 2J

Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

Remote Sensing in the Study of Coastal Processes,
W74-03373 7B

MAHNKE, C. W.
Direct Fluorescent-Antibody Technique for the Microbiological Examination of Food and Environmental Swab Samples for Salmonellae,
W74-03569 5A

MALANCHUK, J. L.
Toxicity of Lead Nitrate to Algae,
W74-03595 5C

MALCOLM, R. L.
Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

MARGALITH, P.
Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

MARINE, I. W.
Geohydrology of Buried Triassic Basin at Savannah River Plant, South Carolina,
W74-03241 5E

MARSH, G. A.
The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

MASON, C.
Character and Stability of a Natural Tidal Inlet,
W74-03365 2L

MATSUNASHI, J.
On a Coexistence System of Flow and Waves,
W74-03688 8B

MAYSTRENKO, YU. G.
Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

MCARTHUR, D. S.
Longshore Currents and Nearshore Topographies,
W74-03627 2E

MCCLOY, J. M.
Longshore Currents and Nearshore Topographies,
W74-03627 2E

MCCRACKEN, R. J.
Organic Compounds in Soil Water of Some Ultisols of the Atlantic Coastal Plain,
W74-03494 2G

MCDONALD, G. C.
Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

MCHENRY, J. R.
Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

MEADE, R. H.
The Coastal Environment of New England,
W74-03453 2L

MEERS, J. L.
The Effect of Discontinuous Methanol Addition on the Growth of a Carbon-Limited Culture of Pseudomonas,
W74-03584 5C

MELESHIN, V. P.
Role of Present-Day Waters in the Karstification of Carbonate Rocks on the Crimean Lowland (Rol' sovremennykh vod v zakarstovanii karbonatnykh porod ravninnogo Kryma),
W74-03258 2K

MEYER, R. E.
Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

MIDDLEBROOKS, E. J.
Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

MIEURE, J. P.
Determination of Trace Organics in Air and Water,
W74-03576 5A

MILLER, R. L.
A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

MIMURA, K.
Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

MINAKAWA, K.
Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

MITCHELL, R.
Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

MITSUYASU, H.
Shock Pressure of Breaking Wave,
W74-03684 8B

MIYATA, M.
The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

MOBAREK, I. E.
Diffraction of Wind Generated Water Waves,
W74-03680 8B

MODLIN, R. F.
A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

MOFFATT, J. D.
A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

MOLNAU, M.
The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

MONTGOMERY, W. D.
Resource Allocation, Information Cost and the Form of Government Intervention,
W74-03485 5G

MOON, C. E.
Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

MORETTI, R. L.
Sterile Culture Techniques for Species of the Rotifer Asplanchna,
W74-03316 5A

MORI, T.
Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

MORRISON, D. R.
An Instrumentation System to Measure Near-Bottom Conditions on the Continental Shelf,
W74-03353 2J

MORTIMORE, C. G.
Effects of Reducing Interplant Competition for Light and Water on Stalk Rot of Corn,
W74-03516 3F

MOUNT, D. I.
Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

MUDRY, N.
Changing Attitudes in Water Resources Development in the Province of Manitoba,
W74-03747 6B

MUELLER, G.
Heavy Metals in the Sediments of the Danube, Ems, Weser and Elbe Rivers in West Germany, (In German),
W74-03552 5B

MULLIN, M. M.
A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

MURATA, H. H.
Castaic Lake Area Recreation Development Plan,
W74-03481 6B

MUROTA, A.
Transformation of Surges,
W74-03687 8B

MURPHY, K. L.
Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

MURRAY, S. P.
Effects of Particle Size and Wave State on Grain Dispersion,
W74-03344 2L

MYHRE, D. L.
Soil Surface Roughness and Straw Mulch for Maximum Beneficial Use of Rainfall by Corn on a Blackland Soil,
W74-03515 3F

NAGAI, S.
Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

NAGAI, T.
Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

NAKAMURA, K.
The Generation of Edge Waves by Cylindrical Waves Impinging From the Outer Sea,
W74-03451 2E

NAKAMURA, M.
Wave Decaying Due to Breaking,
W74-03683 8B

NAKASATO, H.
Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

NAKASATO, S.
Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

NAKHSHINA, YE. P.
Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

NASU, N.
Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

NEAL, V. T.
Predicted Flushing Times and Pollution Distribution in the Columbia River Estuary,
W74-03704 5B

NEEL, J. K. SR
Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

NEILSON, F. M.
Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

NETTIETON, W. D.
Organic Compounds in Soil Water of Some Ultisols of the Atlantic Coastal Plain,
W74-03494 2G

NICHOLLS, K. H.
Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

NICHOLS, M. M.
Characteristics of Sedimentary Environments in Moriches Bay,
W74-03707 2L

NISHIKADO, H.
Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

NODA, E. K.
Equilibrium Beach Profile Scale-Model Relationship,
W74-03457 2J

NODA, H.
Model Study on the Filling-Up of a Fishery Harbor by Drifting Sand,
W74-03691 2L

NOEL, D.
Importance of Diatoms in the Present Varve Deposition (Alternation of Annual Layers) of Green Lake (Near Fayetteville, N.Y.), Model of Confined Sedimentation, (In French),
W74-03577 2H

NORDHEIM, E. I.
Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

NORMAN, J. D.
Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

NORRIS, R. M.
Dams and Beach-Sand Supply in Southern California,
W74-03708 2J

O'BRIEN, M. P.
Equilibrium Flow Areas of Tidal Inlets on Sandy Coasts,
W74-03695 8B

O'CONNELL, R. L.
Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

O'CONNOR, B. A.
Suspended Sediment in a Tidal Estuary,
W74-03696 2L

O'CONNOR, D. J.
Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

OESTMANN, D. B.
Species Diversity of Benthic Macroinvertebrates in the Des Moines River, Iowa,
W74-03211 5C

OLSSON, D. M.
One-Way Analysis of Variance,
W74-03292 7C

O'MERA, J. F.
Water Control Apparatus Responsive to Leakage or Overflow Conditions,
W74-03663 4A

ORCUTT, D. H.
Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

ORR, T. E.
Numerical Calculation of Wave Refraction Digital Computer,
W74-03343 8B

ORTENGREN, R. W. JR
Surface Characteristics of Windrows,
W74-03618 2L

ORTOLANO, L.
A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

OSBORN, J. E.
Economic Benefits from Irrigation,
W74-03487 6C

OTHMER, D. F.
Sewage Treatment Process,
W74-03657 5D

PADMANABHAMURTY, B.
A Study of Biotropism of Climate in Two Canadian Cities,
W74-03478 5C

PALMER, H. V. R. JR
Recycling Wastes for Mariculture,
W74-03714 5G

PARKER, D. S.
Upgrading Lagoons,
W74-03495 5D

PARSONS, D. A.
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

PARTHENIADES, E.
Depositional Behavior of Fine Sediment in a Turbulent Fluid Motion,
W74-03697 2J

PASQUINI, G.
Forced Flow Passages in Karst Massifs,
W74-03513 2J

PATMORE, L. C.
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

PATTERSON, S. J.
Biodegradation of Urea in River Waters Under Controlled Laboratory Conditions,
W74-03287 5B

PAVELKO, L. T.
Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

PEARSON, E. A.
North Coastal Area Investigation. South Fork EEL River Study: A Summary of the Public Hearing Comments on the Preliminary Edition Dated January 1968, Final Supplement,
W74-03476 6B

PEARSON, G. A.
Suitability of Food Processing Waste Water for Irrigation,
W74-03482 5D

PEASLEE, D. E.
Effect of Phosphate and Chloride Salts on Ammonification in Waterlogged Soils,
W74-03445 2G

PEEK, H. M.
Feasibility Study of Liquid-Waste Injection into Aquifers Containing Salt Water, Wilmington, North Carolina,
W74-03362 5E

PEETERS, W. H. M.
Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

PERRET, N. G.
Waterfowl Habitat Trends in the Aspen Parkland of Manitoba,
W74-03517 4C

PERRY, L.
California Coastal Zone Conservation Act, Interim Permit Control, General,
W74-03379 6F

PERRY, R. L.
Two-Level Skip-Lot Sampling Plans - Operating Characteristic Properties,
W74-03291 7C

PERSOONE, G.
A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

PETTY, R. G.
Dams and Reservoirs in Texas: Part II,
W74-03375 8A

PICKNETT, R. G.
Saturated Calcite Solutions from 10 to 40 Deg C: A Theoretical Study Evaluating the Solubility Product and Other Constants,
W74-03525 2K

PIRIE, D. M.
Coastal Applications of the ERTS-A Satellite,
W74-03374 2J

Remote Sensing in the Study of Coastal Processes,
W74-03373 7B

PLACHE, K. O.
Eagle Eye - New Flowmeter,
W74-03290 7B

POON, C. P. C.
Competitive Growth of Sewage Organisms,
W74-03567 5C

POORMAN, A. E.
Effects of Pesticides on Euglena gracilis. I. Growth Studies,
W74-03571 5C

POORNACHANDRA RAO, M.
Trace-Element Distribution in the Continental-Shelf Sediments off the East Coast of India,
W74-03350 2J

PORCELLA, D. B.
Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

POST, T. R.
Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

POTAPOVA, L. S.
Investigation of Runoff of Kamchatka Rivers Based on Climatic Data (Issledovaniye stoka rek Kamachatki po klimaticheskim dannym),
W74-03259 2E

POULET, S. A.
Grazing of pseudocalanus minutus on Naturally Occuring Particulate Matter,
W74-03593 5B

PRICE, H. A.
Element Specific Gas Chromatographic Analyses of Organochlorine Pesticides in the Presence of PCB's by Selective Cancellation of Interfering Peaks,
W74-03589 5A

PRICE, M. P.
Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

PRILIPKO, I. T.
Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

PTAK, D. J.
Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

PURI, H. S.
Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

RADOSEVICH, G.
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

RAGONE, S. E.
Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

RAHMAN, A.
Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

RAMA SARMA, D. V.
Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

RASMUSSEN, D. H.
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

READ, D. J.
Physiology of Drought Resistance in the Soybean Plant (Glycine max): I. The Relationship Between Drought Resistance and Growth,
W74-03475 3F

REDFIELD, A. C.
Ontogeny of a Salt Marsh Estuary,
W74-03621 2L

REECE, A.
Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

REICHERT, L.
User Attitudes Toward Water Quality and Price, Las Vegas Valley and Reno-Sparks, Nevada,
W74-03331 5G

REID, B.
Recycling on the Land: An Alternative for Water Pollution Control,
W74-03387 5D

Water Pollution Control Handbook--A Citizens Guide to the Federal Water Pollution Control Act Amendments of 1972--Volume II,
W74-03388 5G

REID, J. L.
Near-Shore Circulation in the California Current,
W74-03624 2L

REIGER, G.
The River of Grass is Drying Up,
W74-03718 6G

REINER, N. L.
Filtration System for Liquids,
W74-03662 5F

RENGER, E. H.
A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

RHODES, R. G.
The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

RICE, R. C.
Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

RICE, R. L.
Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

RICHESON, D. T.
Conversion System for Providing Useful Energy from Water Surface Motion,
W74-03669 8C

RITCHIE, J. C.
Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

ROBBINS, L. G.
Response of the Lower Mississippi River to Changes in Valley Slope, Sinuosity and Water Temperature,
W74-03216 2E

ROBERTSON, J. B.
Radioactive- and Chemical-Waste Transport in Groundwater at National Reactor Testing Station, Idaho: 20-Year Case History and Digital Model,
W74-03233 5B

ROBSON, S. G.
Effects of Waste Percolation of Groundwater in Alluvium Near Barstow, California,
W74-03228 5E

ROGOZHKIN, V. I.
Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

ROOTH, C.
Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

ROSE, C. D.
Mortality of Market-Sized Oysters (Crassostrea Virginica) in the Vicinity of a Dredging Operation,
W74-03305 5C

ROSE, C. J.
Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility,
W74-03471 3F

ROSENSHEIN, J. S.
Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

ROWELL, C. F.
Some Technical and Economic Concerns Relating to Shipboard Pollution Abatement,
W74-03743 5D

RUCKELSHAUS, W. D.
Toward Environmental Sanity,
W74-03346 5G

RUSNAK, G. A.
The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

RUSSEL, R. J.
Topographic Changes in the Surf Zone Profile,
W74-03609 2J

RUZO, L. O.
Photochemistry of Bioactive Compounds. Kinetics of Selected s-Triazines in Solution,
W74-03582 5A

RYAN, J. A.
Effect of Phosphate and Chloride Salts on Ammonification in Waterlogged Soils,
W74-03445 2G

RYDEN, J. C.
Potential of an Eroding Urban Soil for the Phosphorus Enrichment of Streams: I. Evaluation of Methods,
W74-03438 5B

SAAD, M. A. H.
Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

SAEKI, H.
The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

SAKOU, T.
The Salinity Regime and Exchange Characteristics of a Shallow Coastal Bay System,
W74-03611 2L

SANDIFER, P. A.
Larvae of the Burrowing Shrimp, Upogebia Affinis, (Crustacea, Decapoda, Upogebiidae) from Virginia Plankton,
W74-03303 2L

Mud Shrimp (Callianassa) Larvae (Crustacea, Decapoda, Callianassidae) from Virginia Plankton,
W74-03307 2L

SANFORD, J. O.
Soil Surface Roughness and Straw Mulch for Maximum Beneficial Use of Rainfall by Corn on a Blackland Soil,
W74-03515 3F

SARGENT, M. G.
Synchronous Cultures of Bacillus subtille Obtained by Filtration With Glass Fiber Filters,
W74-03599 5A

SASAKI, Y.
Wave Decaying Due to Breaking,
W74-03683 8B

SATCHELL, R. L. H.
Artificial Recharge in United Kingdom with Special Reference to London Basin,
W74-03225 4B

SCHAFER, C. T.
Distribution of Foraminifera Near Pollution Sources in Chaleur Bay,
W74-03596 5B

SCHICHT, R. J.
Deep-Well Injection of Desalting-Plant Waste Brine,
W74-03250 5E

SCHMASSMANN, H.
Modification of Artificially Recharged Water in Switzerland,
W74-03234 5B

SCHUBEL, J. R.
Size Distributions of the Suspended Particles of the Chesapeake Bay Turbidity Maximum,
W74-03436 2L

SCHUETZ, R. D.
Photochemistry of Bioactive Compounds. Kinetics of Selected s-Triazines in Solution,
W74-03582 5A

SCHWARTZLOSE, R. A.
Near-Shore Circulation in the California Current,
W74-03624 2L

SCOTTEN, L. N.
Tropical Bay in Danger,
W74-03716 6G

SECKLER, D. W.
Economic Growth and Environmental Decay: The Solution Becomes the Problem,
W74-03492 6B

SEICHTER, P.
Power Input for the Surface Aerator in Waste Water Treatment Plants (Prikon povrchoveho aeracniho michadla pro cisteni odpadnich vod),
W74-03555 5D

SEIDEL, K.
System for Purification of Polluted Water,
W74-03655 5D

SEIDMAN, H.
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

SELINA, N. A.
Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

SELLINGER, A.
Artificial Recharge of Coastal-Plain Aquifer in Israel,
W74-03356 4B

SEO, G.
Shore Protection on the Coast of 'Yaizu',
W74-03700 8B

SHABANA, M. B.
Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

SHALE, D.
Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

SHAPCHENKO, V. M.
pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

SHAPIRA, A.
Production of Bacteriophage by Lyophilized and Oxygen-Exposed Escherichia coli,
W74-03575 5A

SHAPIRO, J.
Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

SHAW, R. P.
The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

SHEMDIN, O. H.
Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

SHEN, M. C.
Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

SHENK, W. E.
A Multispectral Study of an Extratropical Cyclone with Nimbus 3 Medium Resolution Infrared Radiometer Data,
W74-03349 2B

SHIL'KROT, G. S.
Changes in Chemistry of Natural Waters of Cultivated Lands (Izmeneniya khimizma prirodnykh vod kul'turnykh landshaftov),
W74-03257 5B

SHIRAISHI, H.
Wave Decaying Due to Breaking,
W74-03683 8B

SHMIDT, L. I.
pH and the Effectiveness of Effluent Purification (pH i effektivnost' ochistki stochnykh vod),
W74-03556 5D

SHPEYZER, G. M.
Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

SIGNOR, D. C.
Artificial Recharge--State of the Art,
W74-03354 4B

Laboratory Facility for Studies Related to Artificial Recharge,
W74-03360 4B

SILVERMAN, R. W.
A Multiple Specific Ion Detector and Analog Data Processor For a Gas Chromatograph Quadrupole Mass Spectrometer System,
W74-03580 2K

SILVESTER, R.
Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

SILVEY, W. D.
Underground Storage and Retrieval of Fresh Water from A Brackish-Water Aquifer,
W74-03237 4B

SIMENSTAD, C. A.
The Feeding Ecology of the Rock Greenling, Hexagrammos lagocephalus, in the Inshore Waters of Amchitka Island, Alaska,
W74-03505 2I

SIMONOV, A. I.
Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

SIMS, J. L.
Effect of Phosphate and Chloride Salts on Ammonification in Waterlogged Soils,
W74-03445 2G

SINGH, P. K.
Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

SKAISGIRIS, A. YU.
New Composite Effluent-Purification Equipment (Novyi kompleks ochistnykh sooruzhenii),
W74-03554 5D

SKORUPSKAS, I. M.
New Composite Effluent-Purification Equipment (Novyi kompleks ochistnykh sooruzhenii),
W74-03554 5D

SLADECEK, V.
The Reality of Three British Biotic Indices,
W74-03289 5A

The Structure of Saprobic Communities,
W74-03746 2I

SLOAN, R. L.
Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

SLONIM, A. R.
Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

SMIRNOV, M. P.
Distribution and Characteristics of Organic Matter in River Waters of the Tundra Zone (Raspredeleniye i osobennosti organicheskikh veshchestv rechnykh vod tundrovoy zony),
W74-03534 2K

Distribution Patterns of Organic Matter in River Waters of the Wooded Tundra Zone (Zakonomernosti raspredeleniya organicheskogo veshchestva rechnykh vod lesotundrovoy zony),
W74-03255 2K

SMITH, B. J.
North Coastal Area Investigation. South Fork EEL River Study: A Summary of the Public Hearing Comments on the Preliminary Edition Dated January 1968, Final Supplement,
W74-03476 6B

SMITH, D. F. JR
Thermodynamics of Acid-Base Equilibria. m' and p' Hydroxybenzaldehyde,
W74-03738 2K

SMITH, W. G.
Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

SMRCHEK, J. C.
Comparative Ecology and Zooplankton of Two Maryland Ponds Including a Congeneric Occurrence of Diaptomus (Calanoida: Copepoda),
W74-03308 5C

SMYTHE, A.
Emphasizing Quality Control,
W74-03636 5F

SONU, C. J.
Longshore Currents and Nearshore Topographies,
W74-03627 2E

Topographic Changes in the Surf Zone Profile,
W74-03609 2J

SORENSEN, R. M.
Character and Stability of a Natural Tidal Inlet,
W74-03365 2L

SOREY, M. L.
Use of Finite-Difference Arrays of Observation Wells to Estimate Evapotranspiration from Ground Water in the Arkansas River Valley, Colorado,
W74-03508 2D

SORGELOOS, P.
A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

SOULE, D. M.
Reservoirs and Local Government Finance,
W74-03748 6B

SPOMER, L. A.
Saturated Water Flow Through Clay Pots,
W74-03306 3F

SPROUL, C. R.
Artificial Recharge of Treated Waste Waters and Rainfall Runoff into Deep Saline Aquifers of Peninsula of Florida,
W74-03242 5E

SRIVASTAVA, U. S.
Edaphic Factors and Wilt of Coriander,
W74-03281 5C

STANKEWICH, M. J. JR
Phosphorous Removal from Wastewater,
W74-03667 5D

STAPOR, F. W.
Tabasco Beach-Ridge Plain: An Eroding Coast,
W74-03441 2J

STEFFEN, A. J.
Pretreatment of Poultry Processing Wastes: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03497 5D

STEINKAMP, J. A.
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

STERNBERG, R. W.
An Instrumentation System to Measure Near-Bottom Conditions on the Continental Shelf,
W74-03353 2J

STILLINGER, F. H.
Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

STOCKMAN, K. W.
The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

STONE, W.
Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

STOUTAMIRE, D. W.
Characterization and Microdetermination of a Water-Soluble Metabolite from Bladex Herbicide by Conversion to 5,5-Dimethylhydantion,
W74-03587 5A

SU, G. C. C.
Element Specific Gas Chromatographic Analyses of Organochlorine Pesticides in the Presence of PCB's by Selective Cancellation of Interfering Peaks,
W74-03589 5A

SULLIVAN, E. G.
Environmental Aspects of Watershed Planning,
W74-03215 6G

SUN, R. J.
Hydraulic Fracturing As a Tool for Disposal of Wastes in Shale,
W74-03231 5E

SWANSON, G.
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

SWIFT, L. W. JR
Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

SYERS, J. K.
Potential of an Eroding Urban Soil for the Phosphorus Enrichment of Streams: I. Evaluation of Methods,
W74-03438 5B

TAKAYAMA, S.
A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

TANG, F. L. W.
Numerical Calculation of Wind Waves in Shallow Water,
W74-03675 8B

TANNER, W. F.
Falling Water Level Ripple Marks,
W74-03449 2L

Tabasco Beach-Ridge Plain: An Eroding Coast,
W74-03441 2J

TARASOV, M. N.
Distribution Patterns of Organic Matter in River Waters of the Wooded Tundra Zone (Zakonomernosti raspredeleniya organicheskogo veshchestva rechnykh vod lesotundrovoy zony),
W74-03255 2K

Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

TAYLOR, A. C.
A Planning Model for A Water Quality Management Agency,
W74-03469 5G

TAYLOR, A. D.
On Singular Boundary Value Problems for the EPD Equation,
W74-03617 2E

TAYLOR, J. C.
Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

THOMANN, R. V.
Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

THOMAS, A.
Oxygen Activated Sludge Wastewater Treatment Systems: Design Criteria and Operating Experience,
W74-03496 5D

THOMAS, T. K.
Instrumentation for Water Pollution Monitoring,
W74-03640 5D

THORN, W.
Method of Digesting and Further Processing Fresh Sewage Sludge or Sapropel,
W74-03671 5D

TITOV, L. F.
Wind-Driven Waves,
W74-03673 2E

TJIOE, P. S.
Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

TOBER, G.
Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

TOETZ, D. W.
Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

TOLMAZIN, D. M.
Features of Horizontal Turbulence in the Littoral Zone of the Ocean,
W74-03452 2E

TRAETTEBERG, A.
Hydraulic Survey and Model Investigation of the Inner Rana Fjord,
W74-03701 2L

TRIMBLE, J. A.
An Instrumentation System to Measure Near-Bottom Conditions on the Continental Shelf,
W74-03353 2J

TSUCHIYA, Y.
Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

TUBAKI, K.
Aquatic Sediment as a Habitat of Emericellopsis, With a Description of an Undescribed Species of Cephalosporium,
W74-03568 5A

TUCKER, J. C.
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

TURNER, J. E.
In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

TURNER, P. A.
Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

TUTTLE, J. H.
Dissimilatory Reduction of Inorganic Sulfur by Facultatively Anaerobic Marine Bacteria,
W74-03597 5C

UHTE, W. R.
Upgrading Lagoons,
W74-03495 5D

UNOKI, S.
A Possibility of Generation of Surf Beats,
W74-03681 8B

VAIDYARAMAN, P. P.
Salinity Distribution and Effect of Fresh Water Flows in the Hooghly River,
W74-03702 2L

VAN DORN, W. G.
Runup Recipe for Periodic Waves on Uniformly Sloping Beaches,
W74-03686 8B

VARGA, L. P.
Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

VECCHIOLI, J.
Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

VENRICK, E. L.
A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

VERNON, R. O.
Artificial Recharge of Treated Waste Waters and Rainfall Runoff into Deep Saline Aquifers of Peninsula of Florida,
W74-03242 5E

VICTOR, P. A.
Pollution: Economy and Environment,
W74-03493 6B

VOLCANI, B. E.
Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

VOLLBRECHT, K.
The Relationships Between Wind Records, Energy of Longshore Drift, and Energy Balance Off the Coast of a Restricted Body of Water, As Applied to the Baltic,
W74-03431 2J

VOLOSHKO, L. N.
Dynamics of Phytoplankton in the Lower Volga and the Main Channels of its Delta, (In Russian),
W74-03646 5C

VOLOVIK, YU. I.
Chemical Composition of Water in Agrakhanskiy Bay (O khimicheskom sostave vody Agrakhanskogo zaliva),
W74-03527 2K

VORONOV, A. G.
The Formation of Phytocenoses on the Liberated Ground of Lake Sevan, (In Russian),
W74-03632 2H

VYKHRISTYUK, L. A.
Readily Hydrosable Organic Matter in Bottom Sediments of Lake Baikal, (In Russian),
W74-03715 5C

WALLACE, A.
Emphasizing Quality Control,
W74-03636 5F

WALRATH, D.
Upgrading Existing Wastewater Treatment Plants: Case Histories,
W74-03500 5D

WALTER, C. M.
Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

WALTER, I.
The Pollution Content of American Trade,
W74-03490 5G

WALZER, J.
Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

WANG, H.
Water Waves From Underwater Explosions in Shallow Water, Part I: A Mathematical Model for Waves in Constant Depth and in Shoaling Water,
W74-03454 2L

WANG, K. K.
Competitive Growth of Sewage Organisms,
W74-03567 5C

WARD, F.
The Imperiled Everglades,
W74-03720 6G

WARNER, D. L.
Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

WARNER, M. L.
Aggregates and Externalities: Information Needs for Public Natural Resource Decision-Making,
W74-03474 6B

WARNKE, D. A.
Conditions of Beach Retrogression in a Low-Energy Environment,
W74-03456 2J

WATANABE, S.
Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

WATKINS, F. A.
Hydrogeologic Considerations in Land Spreading of Sewage Treatment-Plant Effluent in Central Florida,
W74-03518 5D

WATSON, C. W.
Course of Action Under Federal Common Law for Pollution of Interstate Waters,
W74-03382 5G

WEBBER, L. R.
A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

WEEKS, E. P.
Use of Finite-Difference Arrays of Observation Wells to Estimate Evapotranspiration from Ground Water in the Arkansas River Valley, Colorado,
W74-03508 2D

WEGGEL, J. R.
Maximum Breaker Height for Design,
W74-03363 8B

WELCH, E. B.
Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

WERKMAN, R. T.
Containing and Removing Oil Spills on Water,
W74-03670 3A

WESTPHAL, R. L.
Analysis of the Benthic Macroinvertebrate Community Structure for Assessment of Water Quality of Des Moines River,
W74-03210 5C

WHITEHEAD, W. R.
Saline Aquifers--Future Storage Reservoirs for Fresh Water,
W74-03224 5E

WHITNEY, E. W.
Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

WIEGEL, R. L.
Diffraction of Wind Generated Water Waves,
W74-03680 8B

WILBUR, R. L.
Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

WILCOX, E. A.
Oxygen Activated Sludge Wastewater Treatment Systems: Design Criteria and Operating Experience,
W74-03496 5D

WILKES, D.
Legal Factors in Econometric Modeling of Local Floodplain Management Devices in the Connecticut River Basin,
W74-03207 6F

WILKINSON, W. B.
Artificial Recharge in United Kingdom with Special Reference to London Basin,
W74-03225 4B

WILLEY, B. F.
Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

WILLIAMS, D. T.
Dibutyl- and Di- (2-Ethylhexyl)Phthalate in Fish,
W74-03590 5A

WILLIAMS, E.
Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

WILLIAMS, H. D.
Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

WILLIAMS, S.
Optimizing Water Use: The Return Flow Issue,
W74-03385 6E

WILLIS, J. C.
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

WILSON, W. E.
Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

WINFIELD, R. P.
Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

WINSTON, G. O.
Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

WOLFE, N. L.
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

WONG, A. S.
Photodecomposition of P-Chlorophenoxyacetic Acid,
W74-03583 5B

Photodecomposition of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) in Water,
W74-03585 5B

WOOD, D. J.
Minimum Cost Design of Water Distribution Systems,
W74-03205 8A

WOODARD, H. J.
Artificial Recharge of Treated Waste Waters and Rainfall Runoff into Deep Saline Aquifers of Peninsula of Florida,
W74-03242 5E

WOODS, D. R.
Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

WU, S.
The Meteorological Effects on Microwave Apparent Temperatures Looking Downward Over a Smooth Sea,
W74-03511 7B

WU, S. T.
A Non-Coherent Model for Microwave Emissions and Backscattering from the Sea Surface,
W74-03510 7B

WYRTKI, K.
Approach of Tides to the Hawaiian Islands,
W74-03620 2E

YAKUSHEVA, A. S.
Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

YAKUWA, I.
Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

YAMAGISHI, H.
Ecological Studies on Dissolved Oxygen and Bloom of Microcystis in Lake Suwa: I. Horizontal Distribution of Dissolved Oxygen in Relation to Drifting of Microcystis by wind,
W74-03524 5C

YAMAMOTO, J.
Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

YAMAMOTO, S.
Underground Waste Disposal and Artificial Recharge in Japan,
W74-03226 5E

YATES, P. J.
Castaic Lake Area Recreation Development Plan,
W74-03481 6B

YOUNG, J. O.
The Occurrence of Microturbellaria in Some British Lakes of Diverse Chemical Content,
W74-03282 5C

YOUNG, J. W.
Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

YOUNG, R. H. F.
Virus Removal in Hawaiian Soils,
W74-03293 5F

YOUNGERMAN, J. M.
Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

ZABIK, M. J.
Photochemistry of Bioactive Compounds. Kinetics of Selected s-Triazines in Solution,
W74-03582 5A

ZEIGLER, J. M.
A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

ZENIN, A. A.
Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

Chemical Composition of Water in Agrakhanskiy Bay (O khimicheskom sostave vody Agrakhanskogo zaliva),
W74-03527 2K

A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

ZENKOVICH, V. P.
The Coastal Shoals of Western Cuba and Their Deposits,
W74-03443 2L

ZEPP, R. G.
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

ZHAGGAR, K. B.
Ion Load and Carbonate Equilibrium in the Troitsk Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

ZHIKHAREV, V. V.
Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

ZHURAVLEVA, L. A.
Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

ZWERMAN, P. J.
A Conveniently Constructed Divisor for Splitting Low Water Flows,
W74-03522 7B

ORGANIZATIONAL INDEX

ADADEMIYA NAUK SSSR, MOSCOW. INSTITUT GEOGRAFII.
Investigation of Runoff of Kamchatka Rivers Based on Climatic Data (Issledovaniye stoka rek Kamachatki po klimaticheskim dannym),
W74-03259 2E

AEROSPACE MEDICAL RESEARCH LAB., WRIGHT-PATTERSON AFB, OHIO.
Acute Toxicity of Beryllium Sulfate to the Common Guppy,
W74-03297 5C

AGRICULTURAL RESEARCH SERVICE, NORFOLK, VA.
Suitability of Food Processing Waste Water for Irrigation,
W74-03482 5D

AGRICULTURAL RESEARCH SERVICE, OXFORD, MISS. SEDIMENTATION LAB.
Sediment Yield Estimates Based on Floodwater Measurements and Samples,
W74-03214 2J

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ. WATER CONSERVATION LAB.
Design and Operation of Land Treatment Systems for Minimum Contamination of Groundwater,
W74-03223 5D

Renovating Sewage Effluent by Ground Water Recharge,
W74-03520 5D

AGRICULTURAL RESEARCH SERVICE, STATE COLLEGE, MISS.
Soil Surface Roughness and Straw Mulch for Maximum Beneficial Use of Rainfall by Corn on a Blackland Soil,
W74-03515 3F

AGRICULTURAL UNIV., WAGENINGEN (NETHERLANDS). DEPT. OF SOILS AND FERTILIZERS.
The Significance of the Fallow Year in the Dry-Farming System of the Great Konya Basin, Turkey,
W74-03605 3F

AGRICULTURAL UNIV., WAGENINGEN (NETHERLANDS). DEPT. OF TOXICOLOGY.
Mercury-Selenium Correlations in Marine Mammals,
W74-03603 5C

AKADEMIYA NAUK SSSR, KALININGRAD. INSTITUT OKEANOLOGII.
Morphometric Analysis of Short-Period Changes in the Topography of the Shore,
W74-03341 2J

Dynamics and Morphology of the Sambian Peninsula,
W74-03462 2J

AKADEMIYA NAUK SSSR, MOSCOW. DEPT. OF GENERAL BIOLOGY.
Dynamics of Phytoplankton in the Lower Volga and the Main Channels of its Delta, (In Russian),
W74-03646 5C

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT GEOGRAFII.
Changes in Chemistry of Natural Waters of Cultivated Lands (Izmeneniya khimizma prirodnykh vod kul'turnykh landshaftov),
W74-03257 5B

Fifth All-Union Symposium on Glaciology (O pyatom obshchesoyuznom glyatsiologicheskom simpoziume),
W74-03260 2C

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT OKEANOLOGII.
The Coastal Shoals of Western Cuba and Their Deposits,
W74-03443 2L

AKADEMIYA NAUK SSSR, NOVOSIBIRSK.
Mass Development of Hydrurus in the Yenisei Below the Krasnoyarsk Reservoir Dam, (In Russian),
W74-03550 4A

AKADEMIYA NAUK URSR, KIEV. INSTYTUT HIDROBIOLOGII.
Trace Elements in Bottom Sediments of Dnieper River Reservoirs (Mikroelementy v donnykh otlozheniyakh vodokhranilishch r. Dnepra),
W74-03254 2K

Possible Changes in Salinity of Water in the Dnieper-Bug Lagoon in Connection with Future Diminution of Streamflow (Vozmozhnyye izmeneniya solenosti vody Dneprovsko-Bugskogo limana v svyazi s predstoyashchim sokrashcheniyem rechnog o stoka),
W74-03530 2L

Techniques in Forecasting Content of Organic and Biogenic Substances in Water of Existing and Proposed Water Bodies (K metodike prognozirovaniya soderzhaniya organicheskikh i biogennykh veshchestv v vode sushchestvuyushchikh i proyektir uyemykh vodoyemov),
W74-03535 2H

ALAMO AREA COUNCIL OF GOVERNMENTS, SAN ANTONIA, TEX.
The Water Resource Management Plan for the AACOG Planning Region, Volume I: Methodology Analysis of Water Resource Areas.
W74-03642 6B

ALAMO AREA COUNCIL OF GOVERNMENTS, SAN ANTONIO, TEX.
The Water Resource Management Plan for the AACOG planning Region, Volume II: Urban Water-Related Services.
W74-03643 6B

The Water Resource Management Plan for the AACOG Planning Region, Volume III: Short Range Program 1970-1975.
W74-03644 6B

ALEXANDRIA UNIV., (EGYPT). DEPT. OF OCEANOGRAPHY.
Effect of Pollution on the Blood Characteristics of Tilapia zillii G.,
W74-03591 5C

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, INC., TULSA, OKLA.
Underground Waste Management and Artificial Recharge, Volumes 1 and 2.
W74-03222 5E

AMERICAN BAR ASSOCIATION, WASHINGTON, D.C. NATURAL RESOURCES LAW SECTION.
The Draft United Nations Convention on the International Seabed Area - American Bar Association Position,
W74-03377 6E

ANDHRA UNIV., WALTAIR (INDIA). DEPT. OF GEOLOGY.
Trace-Element Distribution in the Continental-Shelf Sediments off the East Coast of India,
W74-03350 2J

ANDHRA UNIV., WALTAIR (INDIA). DEPT. OF ZOOLOGY.
Mixing and Circulation in Gautami-Godavari Estuary,
W74-03459 2L

ARGONNE NATIONAL LAB., ILL.
Hydrogen-Bond Patterns in Liquid Water,
W74-03539 1A

ARIZONA STATE UNIV., TEMPE. DEPT. OF ZOOLOGY.
Streptocephalus Moorei N. Sp., a New Fairy Shrimp (Anostraca) From Mexico,
W74-03319 2I

ARIZONA WATER RESOURCES RESEARCH CENTER, TUCSON; AND ARIZONA AGRICULTURAL EXPERIMENT STATION, TUCSON.
Proposed Municipal Waste Water--Groundwater Exchange, City of Tucson: Avra-Marana Valley.
W74-03340 5G

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C.
Maximum Breaker Height for Design,
W74-03363 8B

Character and Stability of a Natural Tidal Inlet,
W74-03365 2L

Suspended Sediment and Longshore Sediment Transport Data Review,
W74-03368 2J

Longshore Transport of Suspended Sediment,
W74-03369 2J

Coastal Sand Mining in Northern California, U.S.A.,
W74-03371 8C

Remote Sensing in the Study of Coastal Processes,
W74-03373 7B

Coastal Applications of the ERTS-A Satellite,
W74-03374 2J

Radioisotopic Sand Tracer Study Point Conception, California. Preliminary Report on Accomplishments July 1966 - June 1968,
W74-03608 2J

Bed Forms Generated in the Laboratory Under an Oscillatory Flow: Analytical and Experimental Study,
W74-03612 8B

A Model Study of the Entrance Channel Depoe Bay, Oregon,
W74-03614 8B

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C. COASTAL PROCESSES BRANCH.
A Gross Longshore Transport Rate Formula,
W74-03367 2J

Wave Runup on Vertical Cylinders,
W74-03372 8B

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C. ENGINEERING DEVELOPMENT DIV.
Time-Interval Photography of Littoral Phenomena,
W74-03364 2J

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C. EVALUATION BRANCH.
State of Groin Design and Effectiveness,
W74-03370 8A

ARMY ENGINEER DISTRICT, LOS ANGELES, CALIF. COASTAL ENGINEERING BRANCH.
Littoral Bypassing and Beach Restoration in the Vicinity of Port Hueneme California,
W74-03694 8B

ARMY ENGINEER DISTRICT, VICKSBURG, MISS.
Response of the Lower Mississippi River to Changes in Valley Slope, Sinuosity and Water Temperature,
W74-03216 2E

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Mathematical Modeling of Water Quality,
W74-03217 5B

Multiple Outlet Selective Withdrawal Technique for Water Quality Prediction of Lake Releases,
W74-03218 5B

Pilot Model Study for the Design of Hilo Harbor Tsunami Model. Hydraulic Model Investigation,
W74-03613 8B

Survey of Gulf Coast Structural Damage Resulting from Hurricane Camille, August 1969,
W74-03623 8B

AUSTRALIAN NATIONAL UNIV., CANBERRA. DEPT. OF BIOGEOGRAPHY AND GEOMORPHOLOGY.
Structure and Texture of a Gravelly Barrier Island in the Fitzroy Estuary, Western Australia, and the Role of Mangroves in the Shore Dynamics,
W74-03351 2L

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH.
A Mathematical Model for Optimum Design and Control of Metropolitan Wastewater Management Systems,
W74-03468 5D

Delayed Recovery of a Mesotrophic Lake After Nutrient Diversion,
W74-03560 5C

BEAK (T. W.) CONSULTANTS LTD., MONTREAL (QUEBEC).
Review of Rapid BOD Test Methods,
W74-03557 5A

BEDFORD INST., DARTMOUTH (NOVA SCOTIA).
Distribution of Foraminifera Near Pollution Sources in Chaleur Bay,
W74-03596 5B

BEDFORD INST., DARTMOUTH (NOVA SCOTIA). ATLANTIC OCEANOGRAPHIC LAB.
A Method for the High Temperature Gas Chromatographic Analyses of Petroleum Residues,
W74-03579 5A

BEMIDJI STATE COLL., MINN. DEPT. OF BIOLOGY.
Preparation of Slide Periphyton for Various Productivity Analyses,
W74-03315 7B

BIOLOGISCHE ANSTALT HELGOLAND, (WEST GERMANY).
Physiological Aspects of Animal Life in Estuaries with Special Reference to Salinity,
W74-03461 2L

BISHOP (WILLIAM), TALLAHASSEE, FLA.
Engineering Design Criteria for Spray Irrigation,
W74-03521 5D

BLACK, CROW AND EIDSNESS, INC., GAINESVILLE, FLA.
Artificial Recharge of Treated Waste Waters and Rainfall Runoff into Deep Saline Aquifers of Peninsula of Florida,
W74-03242 5E

BOWLING GREEN STATE UNIV., OHIO. DEPT. OF BIOLOGY.
An Aerophilous Diatom Community from Hocking County, Ohio,
W74-03318 5A

BOYLE ENGINEERING, SANTA ANA, CALIF.
Water Facilities for East Orange Area for City of Orange and East Orange County Water District.
W74-03648 3D

BROWN AND CALDWELL, SAN FRANCISCO, CALIF.
Upgrading Lagoons,
W74-03495 5D

BUCHAREST UNIV. (ROMANIA). FACULTY OF BIOLOGY.
Observations on the Ecology and Distribution of the Turbellarian Fauna of the Danube Delta (Beobachtungen uber die Okologie und Verbreitung der Turbellarienfauna im Donaudelta),
W74-03574 5C

BUREAU OF MINES, BARTLESVILLE, OKLA. BARTLESVILLE ENERGY RESEARCH CENTER.
History of a Two-Well Industrial-Waste Disposal System,
W74-03247 5E

BUREAU OF RECLAMATION, FRESNO, CALIF.
The Water Cycle on a Watershed in the Palouse Region of Idaho,
W74-03739 4A

CALIFORNIA INST. OF TECH., PASADENA. ENVIRONMENTAL QUALITY LAB.
Resource Allocation, Information Cost and the Form of Government Intervention,
W74-03485 5G

CALIFORNIA INST. OF TECH., PASADENA. W. M. KECK LAB. OF HYDRAULICS AND WATER RESOURCES.
Dispersion in Hydrologic and Coastal Environments,
W74-03327 5B

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO.
North Coastal Area Investigation. South Fork EEL River Study: A Summary of the Public Hearing Comments on the Preliminary Edition Dated January 1968, Final Supplement,
W74-03476 6B

Castaic Lake Area Recreation Development Plan,
W74-03481 6B

The California State Water Project in 1968,
W74-03502 6B

Upper Eel River Development. Investigation of Alternative Conveyance Routes,
W74-03503 6B

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD, SACRAMENTO.
Useful Waters for California.
W74-03504 5G

CALIFORNIA UNIV., BERKELEY.
Series Solutions for Shallow Water Waves,
W74-03440 2E

CALIFORNIA UNIV., BERKELEY. COLL. OF ENGINEERING.
Equilibrium Flow Areas of Tidal Inlets on Sandy Coasts,
W74-03695 8B

CALIFORNIA UNIV., DAVIS. DEPT. OF ENVIRONMENTAL TOXICOLOGY.
Photodecomposition of P-Chlorophenoxyacetic Acid,
W74-03583 5B

Photodecomposition of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) in Water,
W74-03585 5B

CALIFORNIA UNIV., DAVIS. INST. OF GOVERNMENTAL AFFAIRS.
Constructing Nonlinear Dynamic Models for Socio-Environmental Decisionmaking: A Methodology,
W74-03501 6A

CALIFORNIA UNIV., LOS ANGELES.
Characteristics of Sedimentary Environments in Moriches Bay,
W74-03707 2L

CALIFORNIA UNIV., LOS ANGELES. DEPT. OF GEOLOGY.
Beach Cusps: Response to Plateau's Rule,
W74-03460 2J

CALIFORNIA UNIV., LOS ANGELES. DEPT. OF PHARMACOLOGY.
A Multiple Specific Ion Detector and Analog Data Processor For a Gas Chromatograph Quadrupole Mass Spectrometer System,
W74-03580 2K

CALIFORNIA UNIV., RIVERSIDE. DEPT. OF BIOLOGY.
Sterile Culture Techniques for Species of the Rotifer Asplanchna,
W74-03316 5A

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA.
Germanium Incorporation into the Silica of Diatom Cell Walls,
W74-03280 5C

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA. INST. OF MARINE RESOURCES.
Regressions Between Biological Oceanographic Measurements in the Eastern Tropical Pacific and Their Significance to Ecological Efficiency,
W74-03559 5B

A Study of Plankton Dynamics and Nutrient Cycling in the Central Gyre of the North Pacific Ocean,
W74-03561 5B

CALIFORNIA UNIV., SANTA BARBARA. DEPT. OF GEOLOGY.
Dams and Beach-Sand Supply in Southern California,
W74-03708 2J

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO. SYSTEMS ENGINEERING DIV.
Integrated System Identification and Optimization for Conjunctive Use of Ground and Surface Water Phase I,
W74-03201 2F

CENTRAL PUBLIC HEALTH ENGINEERING RESEARCH INST., NAGPUR (INDIA).
Conventional Treatment Methods for Pulp and Paper Mill Wastes and Disposal on Land for Irrigation,
W74-03547 5D

Pulp and Paper Mill Wastes Treatment; Alternatives and Cost Economics,
W74-03548 5D

CENTRAL RESEARCH INST. OF ELECTRIC POWER INDUSTRY, TOKYO (JAPAN).
Response Characteristics of Tokyo Bay to Incident Long Waves,
W74-03706 2L

CENTRAL RICE RESEARCH INST., CUTTACK (INDIA). DEPT. OF BLUE-GREEN ALGAE.
Nitrogen Fixation by the Unicellular Blue-Green Alga Aphanothece,
W74-03278 5C

CENTRAL WATER AND POWER RESEARCH STATION, POONA (INDIA).
Salinity Distribution and Effect of Fresh Water Flows in the Hooghly River,
W74-03702 2L

CENTRE D'OCEANOGRAPHIE, MARSEILLE (FRANCE). STATION MARINE D'ENDOUME.
Study of a Polluted Environment (The Old Port Area of Marseilles): The Influence of Physical and Chemical Conditions on the Characteristics of the Population of the Quay, (In French),
W74-03719 5C

CHICAGO DEPT. OF WATER AND SEWERS, ILL. WATER PURIFICATION DIV.
Identification and Incidence of Klebsiella in Chlorinated Water Supplies,
W74-03294 5A

CHICAGO UNIV., ILL. DEPT. OF GEOPHYSICAL SCIENCES.
Effects of Particle Size and Wave State on Grain Dispersion,
W74-03344 2L

CHICAGO UNIV., ILL. DEPT. OF THE GEOPHYSICAL SCIENCES.
A Study of Sediment Distribution in the Zone of Shoaling Waves Over Complicated Bottom Topography,
W74-03709 2J

COLECO INDUSTRIES, INC., HARTFORD, CONN. (ASSIGNEE).
Filtration System for Liquids,
W74-03662 5F

COLORADO STATE UNIV., FORT COLLINS.
Rearing Bait Fishes in the Rocky Mountain States,
W74-03261 8I

Determine the Present Volume and Value of Bait Fish Sales by Species in Colorado and Adjacent Mountain States,
W74-03262 8I

Distribution and Community Relationships of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03263 8I

Construction of Experimental Bait Fish Culture Ponds,
W74-03264 8I

Growth and Mortality of the Fathead Minnow as Related to Population Density in Production Ponds,
W74-03265 8I

Lake Distribution in Colorado and Community Relationships of the Fathead Minnow in Two Lake Populations,
W74-03266 8I

Selection of the Optimum Brood Fish Density and Sex Ratios of the Fathead Minnow (Pimephales Promelas) under Prescribed Spawning Conditions,
W74-03267 8I

The Life History of the Fathead Minnow (Pimephales Promelas) in Colorado and Adjacent Mountain States,
W74-03268 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1968 to June 30, 1969,
W74-03269 8I

Distribution in Colorado, Community Relationships, and Preliminary Life History of the White Sucker (Catostomus commersoni)--July 1, 1969 to January 31, 1970,
W74-03270 8I

Pollution Control and the Behavior of the Firm--A Technical Note,
W74-03749 5G

COLORADO STATE UNIV., FT. COLLINS. DEPT. OF ECONOMICS.
Water Law and Its Relationship to Environmental Quality: A Bibliography of Source Material,
W74-03322 5G

COLORADO UNIV., BOULDER. SCHOOL OF LAW.
Optimizing Water Use: The Return Flow Issue,
W74-03385 6E

COMMONWEALTH FORESTRY AND TIMBER BUREAU, CANBERRA (AUSTRALIA).
Immediate Resumption of Growth by Radiata Pine After Five Months of Minimal Transpiration During Drought,
W74-03519 2D

CORNELL UNIV., ITHACA, N.Y. AGRICULTURAL EXPERIMENT STATION.
A Conveniently Constructed Divisor for Splitting Low Water Flows,
W74-03522 7B

CRYOBIOLOGY RESEARCH INST. MADISON, WIS.
Anomalous Heat Capacities of Supercooled Water and Heavy Water,
W74-03740 1B

CULLIGAN, INC., NORTHBROOK, ILL. (ASSIGNEE).
Iodine Treated Activated Carbon and Process of Treating Contaminated Water Therewith,
W74-03651 5D

DALHOUSIE UNIV., HALIFAX (NOVA SCOTIA). INST. OF OCEANOGRAPHY.
Tidal Resonance in the Bay of Fundy and Gulf of Maine,
W74-03434 2L

DARTMOUTH (NOVA SCOTIA). BEDFORD INST.
Grazing of pseudocalanus minutus on Naturally Occuring Particulate Matter,
W74-03593 5B

DEKALB COUNTY PLANNING DEPT., DECATUR, GA.
Natural Features Element of the Comprehensive Plan: A Plan for Action.
W74-03633 4C

DELAWARE UNIV., NEWARK. DEPT. OF BIOLOGICAL SCIENCES.
Nitrate and Nitrite in the Surface Waters of Two Delaware Salt Marshes,
W74-03538 5B

DEPARTMENT OF AGRICULTURE, HARROW (ONTARIO). RESEARCH STATION.
Effects of Reducing Interplant Competition for Light and Water on Stalk Rot of Corn,
W74-03516 3F

DEPARTMENT OF MINES AND NATURAL RESOURCES, WINNIPEG (MANITOBA).
Changing Attitudes in Water Resources Development in the Province of Manitoba,
W74-03747 6B

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, WELLINGTON (NEW ZEALAND). OCEANOGRAPHIC INST.
Coastal Surface Currents Around New Zealand,
W74-03458 2E

DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). ECOLOGICAL SYSTEMS RESEARCH DIV.
Socio-Economic Considerations in Water Resources Planning,
W74-03745 6B

DEPT. OF ENVIRONMENT, BURLINGTON (ONTARIO). CENTRE FOR INLAND WATERS.
Complexing Capacity of Natural Water - Its Significance and Measurement,
W74-03578 5A

DIETERICH STANDARD CORP., BOULDER, COLO. ELLISON INSTRUMENT DIV.
Eagle Eye - New Flowmeter,
W74-03290 7B

DRAKE UNIV., DES MOINES.
The Influences of an Urban Area and a Reservoir on Benthic Macroinvertebrate Production in the Des Moines River, Iowa,
W74-03209 5C

DRAKE UNIV., DES MOINES, IOWA.
Analysis of the Benthic Macroinvertebrate Community Structure for Assessment of Water Quality of Des Moines River,
W74-03210 5C

Species Diversity of Benthic Macroinvertebrates in the Des Moines River, Iowa,
W74-03211 5C

DU PONT DE NEMOURS (E.I.) AND CO., AIKEN, S.C. SAVANNAH RIVER LAB.
Geohydrology of Buried Triassic Basin at Savannah River Plant, South Carolina,
W74-03241 5E

EDGEWOOD ARSENAL, ABERDEEN PROVING GROUND, MD.
Comparative Ecology and Zooplankton of Two Maryland Ponds Including a Congeneric Occurrence of Diaptomus (Calanoida: Copepoda),
W74-03308 5C

ENO FOUNDATION FOR TRANSPORTATION, INC. SAUGATUCK, CONN.
Recreational Demand at Lakes and Reservoirs,
W74-03480 6D

ENVIRONMENTAL ENGINEERING, INC., GAINESVILLE, FLA.
In-Process Pollution Abatement: Upgrading Poultry-Processing Facilities to Reduce Pollution,
W74-03498 5D

ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA. SOUTHEAST ENVIRONMENTAL RESEARCH LAB.
Chemistry of Organomercurials in Aquatic Systems,
W74-03328 5B

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C.
Toward Environmental Sanity,
W74-03346 5G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. OFFICE OF INTERNATIONAL ACTIVITIES.
International Environmental Bibliographies, Series I: Legislative and Regulatory Reports.
W74-03383 5G

ESL, INC., SUNNYVALE, CALIF.
Statistical Prediction of Equilibrium Temperature from Standard Meteorological Data Bases,
W74-03330 5A

ESSO PRODUCTION RESEARCH CO., HOUSTON, TEX. (ASSIGNEE).
Installation of Underwater Pollution Apparatus,
W74-03661 5G

FARBENFABRIKEN BAYER A. G., LEVERKUSEN (WEST GERMANY). ORGANISCH ANALYTISCHES LABORATORIUM.
Modified Atomic Absorption Spectroscopic Methods in Analyses of Trace Metals (Modifizierte atomabsorptionsspektroskopische Methoden zur Metallspuren-Analytik),
W74-03586 5A

FISHERIES AGENCY, TOKYO (JAPAN). FISHING PORT DIV.
Shore Protection on the Coast of 'Yaizu',
W74-03700 8B

FLORIDA ATLANTIC UNIV., BOCA BATON. DEPT. OF BIOLOGICAL SCIENCES.
The Zostera Epifaunal Community in the York River, Virginia,
W74-03302 5A

FLORIDA DEPT. OF NATURAL RESOURCES, ST. PETERSBURG. MARINE RESEARCH LAB.
Preliminary Report on the Hydrography of the Pensacola Bay Estuary, Florida,
W74-03347 2L

FLORIDA STATE UNIV., TALLAHASSEE.
Conditions of Beach Retrogression in a Low-Energy Environment,
W74-03456 2J

FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF GEOLOGY.
Tabasco Beach-Ridge Plain: An Eroding Coast,
W74-03441 2J

Falling Water Level Ripple Marks,
W74-03449 2L

FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF OCEANOGRAPHY.
Methylmercury in Estuarine Sediments,
W74-03602 5B

FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF STATISTICS.
Procedures for Testing the Difference of Means with Incomplete Data,
W74-03581 7C

FLORIDA UNIV., GAINESVILLE. COLL. OF ENGINEERING.
Laboratory Investigations of Whitecaps, Spray and Capillary Waves,
W74-03506 2E

FOOD AND DRUG DIRECTORATE, OTTAWA (ONTARIO). FOOD RESEARCH LABS.
Dibutyl- and Di- (2-Ethylhexyl)Phthalate in Fish,
W74-03590 5A

FOREST SERVICE (USDA), ASHEVILLE, N.C. SOUTHEASTERN FOREST EXPERIMENT STATION.
Lower Water Temperatures Within a Streamside Buffer Strip,
W74-03551 4C

GATES RUBBER CO., DENVER, COLO. (ASSIGNEE).
Controlling Algae with 5- (5 Barbiturilidene)-Rhodanine,
W74-03665 4A

GENERAL ELECTRIC CO., LOUISVILLE, KY.
One-Way Analysis of Variance,
W74-03292 7C

GENERAL FOODS CORP., BATTLE CREEK, MICH. POST DIV. RESEARCH.
Direct Fluorescent-Antibody Technique for the Microbiological Examination of Food and Environmental Swab Samples for Salmonellae,
W74-03569 5A

GENOA UNIV. (ITALY). INST. OF GEOGRAPHY.
Forced Flow Passages in Karst Massifs,
W74-03513 2J

GEOLOGICAL SURVEY, BOISE, IDAHO.
An Evaluation of Water-Quality Data Obtained at Four Streamflow Daily-Record Stations in Idaho,
W74-03507 5A

GEOLOGICAL SURVEY, COLUMBUS, OHIO.
Hydrodynamics of Mount Simon Sandstone, Ohio and Adjoining Areas,
W74-03235 5B

GEOLOGICAL SURVEY, DENVER, COLO.
Role of Borehole Geophysics in Underground Waste Storage and Artificial Recharge,
W74-03229 5E

Case History of Subsurface Waste Injection of an Industrial Organic Waste,
W74-03245 5E

GEOLOGICAL SURVEY, GARDEN GROVE, CALIF.
Effects of Waste Percolation of Groundwater in Alluvium Near Barstow, California,
W74-03228 5E

GEOLOGICAL SURVEY, IDAHO FALLS, IDAHO.
Radioactive- and Chemical-Waste Transport in Groundwater at National Reactor Testing Station, Idaho: 20-Year Case History and Digital Model,
W74-03233 5B

GEOLOGICAL SURVEY, LUBBOCK, TEX.
Artificial Recharge--State of the Art,
W74-03354 4B

Laboratory Facility for Studies Related to Artificial Recharge,
W74-03360 4B

GEOLOGICAL SURVEY, MENLO PARK, CALIF.
Retention of Dissolved Constituents of Waste by Geologic Membranes,
W74-03238 5B

GEOLOGICAL SURVEY, MINEOLA, N.Y.
Short-Term Effect of Injection of Tertiary-Treated Sewage on Iron Concentration of Water in Magothy Aquifer, Bay Park, New York,
W74-03232 5C

GEOLOGICAL SURVEY, NORFOLK, VA.
Underground Storage and Retrieval of Fresh Water from A Brackish-Water Aquifer,
W74-03237 4B

GEOLOGICAL SURVEY, SACRAMENTO, CALIF.
Hazards of Waste Disposal in Groundwater Basins,
W74-03357 5E

GEOLOGICAL SURVEY, TALLAHASSEE, FLA.
Injection of Acidic Industrial Waste inot a Saline Carbonate Aquifer: Geochemical Aspects,
W74-03243 5E

Hydrogeology of Subsurface Liquid-Waste Storage in Florida,
W74-03361 5E

GEOLOGICAL SURVEY, TAMPA, FLA.
Hydrologic Evaluation of Industrial-Waste Injection at Mulberry, Florida,
W74-03244 5E

GEOLOGICAL SURVEY, UNIVERSITY, ALA.
Subsurface Disposal of Liquid Industrial Wastes in Alabama--A Current Status Report,
W74-03227 5E

GEOLOGICAL SURVEY, WASHINGTON, D.C.
Hydraulic Fracturing As a Tool for Disposal of Wastes in Shale,
W74-03231 5E

Use of Finite-Difference Arrays of Observation Wells to Estimate Evapotranspiration from Ground Water in the Arkansas River Valley, Colorado,
W74-03508 2D

GEOLOGICAL SURVEY, WINTER PARK, FLA. WATER RESOURCES DIV.
Hydrogeologic Considerations in Land Spreading of Sewage Treatment-Plant Effluent in Central Florida,
W74-03518 5D

GEOLOGICAL SURVEY, WOODS HOLE, MASS.
The Coastal Environment of New England,
W74-03453 2L

GEORGE WASHINGTON UNIV., WASHINGTON, D.C. NATIONAL LAW CENTER.
The Resolution of Uncertainty,
W74-03479 5G

GEORGETOWN COLL., KY. DEPT. OF ECONOMICS.
Reservoirs and Local Government Finance,
W74-03748 6B

GEORGIA INST. OF TECH., ATLANTA. ENVIRONMENTAL RESOURCES CENTER.
Parabiotic Growth Characteristics of Selected Sewage Bacteria,
W74-03203 5C

GEORGIA INST. OF TECH. ATLANTA. SCHOOL OF CHEMISTRY.
Comparison of Field and Sigma-Inductive Models for the Transmission of Nonconjugative Substituent Effects. The 2,6-Spiro (3,3) Heptyl System,
W74-03737 2K

Thermodynamics of Acid-Base Equilibria. m' and p' Hydroxybenzaldehyde,
W74-03738 2K

GEORGIA-PACIFIC CORP., DELAIR, N.J.
Mill Waste Treatment by Flotation at Delair,
W74-03545 5D

GESELLSCHAFT FUER STRAHLEN- UND UMWELTFORSCHUNG M.B.H., NEUHERBERG BEI MUNICH WEST GERMANY. INSTITUT FUER STRATIGRAPHIE.
Asse Salt Mine, Federal Republic of Germany--Operating Facility for Underground Disposal of Radioactive Wastes,
W74-03358 5E

GHENT RIJKSUNIVERSITEIT (BELGIUM).
A Culture System for Artemia, Daphnia, and Other Invertebrates, with Continuous Separation of the Larvae,
W74-03283 5A

GIDROKHIMICHESKII INSTITUT, NOVOCHERKASSK (USSR).
A Hydrochemical Description of Mouths of Rivers Flowing into the Tsimlyansk Reservoir (Gidrokhimicheskaya kharakteristika ust'yev rek, vpadayushchikh v Tsimlyanskoye vodokhranilische),
W74-03252 2K

Sodium/Potassium Ratio in Water of the Don River (Sootnosheniye natriya i kaliya v vode r. Dona),
W74-03253 5B

Distribution Patterns of Organic Matter in River Waters of the Wooded Tundra Zone (Zakonomernosti raspredeleniya organicheskogo veshchestva rechnykh vod lesotundrovoy zony),
W74-03255 2K

Chemical Composition of Water in Agrakhanskiy Bay (O khimicheskom sostave vody Agrakhanskogo zaliva),
W74-03527 2K

Character of Seasonal Distribution of Mineralization of Water in the Tsimlyansk Reservoir (O kharaktere sezonnogo raspredeleniya mineralizatsii vody Tsimlyanskogo vodokhranilishcha),
W74-03528 2K

Mineralization and Ionic Composition of Ice in Some Water Bodies of the Northern Caucasus (O rezhime mineralizatsii i ionnogo sostava l'da nekotorykh vodoyemov Severnogo Kavkaza),
W74-03529 2K

Microelement Content and Regime in Water and Suspended Solids in the Volga River Basin (Soderzhaniye i rezhim mikroelementov v vode i vo vzveshennykh veshchestvakh v basseyne r. Volgi),
W74-03533 2K

Distribution and Characteristics of Organic Matter in River Waters of the Tundra Zone (Raspredeleniye i osobennosti organicheskikh veshchestv rechnykh vod tundrovoy zony),
W74-03534 2K

GREEN ENGINEERING CO., SEWICKLEY, PA.
Comprehensive Water Systems Needs Plan, 1970-2000, Allegheny County, Pennsylvania.
W74-03650 3D

GUELPH UNIV. (ONTARIO). DEPT. OF ZOOLOGY.
Observations on Red Colored Cells of Peridinium Wisconsinense Eddy from Buckhorn Lake, Ontario,
W74-03320 5C

HARRIS COUNTY POLLUTION CONTROL DEPT. HOUSTON, TEX.
Sediment Coliform Populations and Post Chlorination Behavior of Wastewater Bacteria,
W74-03295 5A

HARVARD UNIV., CAMBRIDGE, MASS. DEPT. OF MECHANICAL ENGINEERING.
The Response of Narrow-Mouthed Harbors in a Straight Coastline to Periodic Incident Waves,
W74-03450 2L

HARVARD UNIV., CAMBRIDGE, MASS. LAB. OF APPLIED MICROBIOLOGY.
Theoretical Effects of Artificial Destratification on Algal Production in Impoundments,
W74-03296 5C

HAWAII UNIV., HONOLULU.
Virus Removal in Hawaiian Soils,
W74-03293 5F

HAWAII UNIV., HONOLULU. DEPT. OF CIVIL ENGINEERING.
Model Studies of Impulsively-Generated Water Waves.
W74-03689 8B

HAWAII UNIV., HONOLULU. DEPT. OF OCEANOGRAPHY.
Approach of Tides to the Hawaiian Islands,
W74-03620 2E

HAZEN AND SAWYER, NEW YORK.
Upgrading Existing Wastewater Treatment Plants: Case Histories,
W74-03500 5D

HEIDELBERG UNIV. (WEST GERMANY). LABORATORIUM FUER SEDIMENTFORSCHUNG.
Heavy Metals in the Sediments of the Danube, Ems, Weser and Elbe Rivers in West Germany, (In German),
W74-03552 5B

HITTMAN ASSOCIATES, INC., COLUMBIA, MD.
Nomographs for Thermal Pollution Control Systems,
W74-03329 5D

HOKKAIDO UNIV., SAPPORO (JAPAN). DEPT. OF CIVIL ENGINEERING.
The Shoaling, Breaking and Runup of the Solitary Wave on Impermeable Rough Slopes,
W74-03685 8B

HOKKAIDO UNIV., SAPPORO (JAPAN). DEPT. OF ENGINEERING SCIENCE.
Studies on Salt Wedge by Ultrasonic Method,
W74-03703 2L

HONEYWELL, INC., FORT WASHINGTON, PA.
Instrumentation for Water Pollution Monitoring,
W74-03640 5D

HONOLULU CITY AND COUNTY BOARD OF WATER SUPPLY, HAWAII.
2020 Plan, Board of Water Supply/City and County of Honolulu.
W74-03649 4B

HYDRAULICS RESEARCH STATION, WALLINGFORD (ENGLAND).
The Old Coastline of the Wash,
W74-03435 2L

The Effects of Water Conservation Works on the Regime of Morecambe Bay,
W74-03483 4A

ILLINOIS STATE GEOLOGICAL SURVEY, URBANA.
Deduction of Flow Patterns in Variable-Density Aquifers from Pressure and Water-Level Observations,
W74-03236 4B

ILLINOIS STATE WATER SURVEY, URBANA.
Deep-Well Injection of Desalting-Plant Waste Brine,
W74-03250 5E

ILLINOIS UNIV., URBANA. DEPT. OF GEOLOGY.
Oxygen and Carbon Isotope Compositions of Altered Carbonates from the Western Pacific, Core 53.0, Deep Sea Drilling Project,
W74-03352 2J

ILLINOIS UNIV., URBANA. DEPT. OF PLANT PHYSIOLOGY AND HORTICULTURE.
Saturated Water Flow Through Clay Pots,
W74-03306 3F

IMPERIAL CHEMICAL INDUSTRIES LTD., BILLINGHAM (ENGLAND). AGRICULTURAL DIV.
The Effect of Discontinuous Methanol Addition on the Growth of a Carbon-Limited Culture of Pseudomonas,
W74-03584 5C

INSTITUTE FOR BIOLOGICAL RESEARCH, BELGRADE (YUGOSLAVIA).
The Chironomids of the Periphyton in the Yugoslav Part of the River Danube (Die

INSTITUTE FOR BIOLOGICAL RESEARCH, BELGRADE (YUGOSLAVIA).

Chironomidenfauna aus dem Periphyton in der jugoslawischen Donaustrecke),
W74-03562 5A

Fishes as Indicators of Water Quality and Their Significance for Economic Use (Fische als Indikator der Gewassergute und ihre Bedeutung fur die wasserwirtschaftliche Nutzung),
W74-03563 5A

INSTITUTE FOR FERMENTATION, OSAKA (JAPAN).

Aquatic Sediment as a Habitat of Emericellopsis, With a Description of an Undescribed Species of Cephalosporium,
W74-03568 5A

INSTITUTE OF BIOLOGY OF THE SOUTHERN SEAS, ODESSA (USSR).

Features of Horizontal Turbulence in the Littoral Zone of the Ocean,
W74-03452 2E

INSTYTUT GOSPODARKI KOMMUNALNEJ, CHORZOW (POLAND). SAMODZIELNA PRACOWNIZ RADIOEKOLOGII.

Cumulation of Radioactive Substance in Dam Reservoirs,
W74-03272 5B

INTERNATIONAL MINERALS AND CHEMICAL CORP., LIBERTYVILLE, ILL. (ASSIGNEE).

Compost for Removing Oil Films from Water,
W74-03658 5D

INTERSTATE COMMISSION ON THE POTOMAC RIVER BASIN, WASHINGTON, D.C.

Statement for Public Meetings of the Department of Army Corps of Engineers Concerning the Reformulation of the Sixes Bridge, Dam, and Lake Project Maryland, and the Verona Dam and Lake Project, Virginia,
W74-03386 5G

IOWA STATE UNIV., AMES. DEPT. OF AGRICULTURAL ENGINEERING.

Gully Bank Erosion: Mechanics and Simulation by Digital Computer,
W74-03202 2J

IRKUTSKII GOSUDARSTVENNYI UNIVERSITET (USSR).

Hydrochemical Description and Calcium-Carbonate Equilibrium of Shumak Carbonate Waters (Gidrokhimicheskaya kharakteristika i karbonatno-kal'tsiyevoye ravnovesiye Shumakskikh uglekislykh vod),
W74-03256 2K

ISRAEL INST. FOR BIOLOGICAL RESEARCH, NES ZIYYONA.

Production of Bacteriophage by Lyophilized and Oxygen-Exposed Escherichia coli,
W74-03575 5A

ITALCONSULT, ROME (ITALY).

Management Science in the Developing Countries: A Comparative Approach to Irrigation Feasibility,
W74-03471 3F

JAPAN OIL CHEMIST SOCIETY, TOKYO. GAS CHROMATOGRAPHY COMMITTEE.

Determination of Fatty Acid Composition by Gas Chromatography: I. Analysis with Use of Thermal Conductivity Detector,
W74-03311 2K

Determination of Fatty Acid Composition by Gas Chromatography: II. Analysis with Use of Flame Ionization Detector,
W74-03312 2K

JENA UNIV. (EAST GERMANY). BIOLOGY SECTION.

In Situ Experimental Investigations of the Biomass Production of Micro-Algae and of Natural Algal Biocoenoses in Flowing Waters, (In German),
W74-03598 5C

JOHNS HOPKINS UNIV., BALTIMORE, MD. CHESAPEAKE BAY INST.

Size Distributions of the Suspended Particles of the Chesapeake Bay Turbidity Maximum,
W74-03436 2L

JOHNS HOPKINS UNIV., BALTIMORE, MD. DEPT. OF PATHOBIOLOGY.

Quantitative Extraction of Adenosine Triphosphate From Cultivable and Host-Grown Microbes: Calculation of Adenosine Triphosphate Pools,
W74-03570 5A

JUSTIN AND COURTNEY, PHILADELPHIA, PA.

Master Plan for Water Supply, Bucks County, Pennsylvania, 1970.
W74-03629 3D

KANSAS STATE DEPT. OF HEALTH, TOPEKA.

Subsurface Disposal of Waste in Kansas,
W74-03248 5E

KANSAS UNIV./CENTER FOR RESEARCH, INC., LAWRENCE.

Backscattering from a Two-Scale Rough Surface with Application to Radar Sea Return,
W74-03509 7B

A Non-Coherent Model for Microwave Emissions and Backscattering from the Sea Surface,
W74-03510 7B

The Meteorological Effects on Microwave Apparent Temperatures Looking Downward Over a Smooth Sea,
W74-03511 7B

KEARNEY STATE COLLEGE, NEBRASKA, BIOLOGY DEPARTMENT.

Effects of Pesticides on Euglena gracilis. I. Growth Studies,
W74-03571 5C

KENT STATE UNIV., OHIO. DEPT. OF BIOLOGICAL SCIENCES.

The Biology of Brown Algae on the Atlantic Coast of Virginia. II. Petalonia Fascia and Scytosiphon Lomentaria,
W74-03309 5A

KENT UNIV., CANTERBURY (ENGLAND). DEPT. OF ECONOMICS.

Pollution: Economy and Environment,
W74-03493 6B

KENTUCKY WATER RESOURCES INST., LEXINGTON.

Social Costs and Benefits of Water Resource Construction,
W74-03204 6B

Minimum Cost Design of Water Distribution Systems,
W74-03205 8A

Sensitivity of Vertebrate Embryos to Heavy Metals as a Criterion of Water Quality,
W74-03206 5C

The Generation of Flood Damage Time Sequences,
W74-03334 4A

KIEL UNIV. (WEST GERMANY). GEOLOGISCH-PALAEONTOLOGISCHES INSTITUT UND MUSEUM.

The Relationships Between Wind Records, Energy of Longshore Drift, and Energy Balance Off the Coast of a Restricted Body of Water, As Applied to the Baltic,
W74-03431 2J

KILEY (DAN) AND PARTNERS, CHARLOTTE, VT.

The Great Miami River Corridor Study: A Concept Plan.
W74-03631 6F

KOBE UNIV. (JAPAN). DEPT. OF CIVIL ENGINEERING.

On a Coexistence System of Flow and Waves,
W74-03688 8B

KYOTO UNIV. (JAPAN). DISASTERS PREVENTION RESEARCH INST.

Observations of the Transformation of Ocean Wave Characteristics Near Coasts by Use of Anchored Buoys,
W74-03676 8B

Laminar Damping of Oscillatory Waves Due to Bottom Friction,
W74-03679 8B

Model Study on the Filling-Up of a Fishery Harbor by Drifting Sand,
W74-03691 2L

KYUSHU UNIV., FUKUOKA (JAPAN). DEPT. OF HYDRAULIC CIVIL ENGINEERING.

Numerical Calculation of Wind Waves in Shallow Water,
W74-03675 8B

LABORATORY OF THE GOVERNMENT CHEMIST, LONDON (ENGLAND).

Biodegradation of Urea in River Waters Under Controlled Laboratory Conditions,
W74-03287 5B

LANCY LABS., INC., ZELIENOPLE, PA.

Waste Treatment: Upgrading Metal-Finishing Facilities to Reduce Pollution,
W74-03499 5D

LINFIELD AND HUNTER, INC., VICKSBURG, MISS.

Treatment of Domestic Sewage at Offshore Locations,
W74-03221 5D

LIVERPOOL UNIV. (ENGLAND). DEPT. OF CIVIL ENGINEERING.

Suspended Sediment in a Tidal Estuary,
W74-03696 2L

LIVERPOOL UNIV. (ENGLAND). DEPT. OF ZOOLOGY.

The Occurrence of Microturbellaria in Some British Lakes of Diverse Chemical Content,
W74-03282 5C

LOCKWOOD, ANDREWS AND NEWNAM, INC., HOUSTON, TEX.

Tidal Inlets for Preservation of Estuaries,
W74-03342 2L

LOS ALAMOS SCIENTIFIC LAB., N. MEX.
A New Multiparameter Separator for Microscopic Particles and Biological Cells,
W74-03313 7B

LOUISIANA STATE UNIV., BATON ROUGE. COASTAL STUDIES INST.
Recent Coastal Sedimentation: Central Louisiana Coast,
W74-03345 2L

Seasonal Variations in Beach Profiles Along the Outer Banks of North Carolina,
W74-03446 2J

Topographic Changes in the Surf Zone Profile,
W74-03609 2J

Longshore Currents and Nearshore Topographies,
W74-03627 2E

LOUISIANA STATE UNIV., BATON ROUGE. DEPT. OF PETROLEUM ENGINEERING.
Saline Aquifers--Future Storage Reservoirs for Fresh Water,
W74-03224 5E

Effect of Formation Dip on the Movement of Fresh Water Stored in Saline Aquifers,
W74-03336 4B

LOUISIANA STATE UNIV., BATON ROUGE. SCHOOL OF GEOSCIENCE.
Geochemical Hydrology of the Baton Rouge Aquifers,
W74-03335 4B

LOUISIANA WATER RESOURCES RESEARCH INST., BATON ROUGE.
Enrichment of Marsh Habitats with Organic Wastes,
W74-03337 5D

LUND UNIV. (SWEDEN). DEPT. OF PHYSICAL GEOGRAPHY.
Some Calculations of the Denudation Rate in a Dolomitic Limestone Area at Isfjord-Radio, West-Spitzbergen,
W74-03514 2J

MACDONALD COLL., STE. ANNE DE BELLEVUE (QUEBEC). DEPT. OF MICROBIOLOGY.
Dissociation in a Marine Pseudomonad,
W74-03566 5A

MAGNITOGORSKII GORNO-METALLURGICHESKII INSTITUT (USSR).
Ion Load and Carbonate Equilibrium in the Troitsk Reservoir (Akkumulyatsiya ionnogo stoka i karbonatnoye ravnovesiye v Troitskom vodokhranilishche),
W74-03532 2H

MAINE UNIV., ORONO. DEPT. OF POLITICAL SCIENCE.
Political and Environmental Attitudes of Voters and Public Officials Related to Alternative Levels of Water Quality and Correlative Levels of Management of the Penobscot River,
W74-03323 5G

MANHATTAN COLL., BRONX, N.Y. ENVIRONMENTAL ENGINEERING AND SCIENCE PROGRAM.
Mathematical Modeling of Eutrophication of Large Lakes,
W74-03537 5C

MARINE BIOLOGICAL ASSOCIATION OF THE UNITED KINGDOM, PLYMOUTH (ENGLAND). PLYMOUTH LAB.
Brown Seaweed as an Indicator of Heavy Metals in Estuaries in South-West England,
W74-03301 5C

MARINE PROTEIN CORP., NEW YORK. (ASSIGNEE).
Water Circulation System for Fresh Water Fish Husbandry,
W74-03659 5D

MARLEY CO., KANSAS CITY, MO. (ASSIGNEE).
Hyperbolic Cross Flow Cooling Tower with Basins and Fill Integrated into Shell,
W74-03668 5D

MARYLAND UNIV., COLLEGE PARK. DEPT. OF AGRICULTURAL AND EXTENSION EDUCATION.
Investigation of the Public and Private Interests in the Chesapeake Bay Area,
W74-03332 6B

MARYLAND UNIV., SOLOMONS. NATURAL RESOURCES INST.
Standing Crop of Salt Marshes Surrounding Chincoteague Bay, Maryland-Virginia,
W74-03304 2L

Mortality of Market-Sized Oysters (Crassostrea Virginica) in the Vicinity of a Dredging Operation,
W74-03305 5C

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Mathematical Simulation of Tidal Time-Averages of Salinity and Velocity Profiles in Estuaries,
W74-03348 2L

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF CHEMICAL ENGINEERING.
Analysis of Trace Organic Compounds in New England Rivers,
W74-03553 5A

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. HYDRODYNAMICS LAB.
Depositional Behavior of Fine Sediment in a Turbulent Fluid Motion,
W74-03697 2J

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. RALPH M. PARSONS LAB. FOR WATER RESOURCES AND HYDRODYNAMICS.
Design of Optimal Precipitation Networks,
W74-03333 2B

MASSACHUSETTS UNIV., AMHERST. DEPT. OF MICROBIOLOGY.
Glucose and Pyruvate Metabolism of Spirochaeta litoralis, an Anaerobic Marine Spirochete,
W74-03600 5B

MASSACHUSETTS UNIV., AMHERST. WATER RESOURCES RESEARCH CENTER.
Legal Factors in Econometric Modeling of Local Floodplain Management Devices in the Connecticut River Basin,
W74-03207 6F

MASSEY UNIV., PALMERSTON NORTH (NEW ZEALAND).
Potential of an Eroding Urban Soil for the Phosphorus Enrichment of Streams: I. Evaluation of Methods,
W74-03438 5B

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENCHAFTEN E.V., GOETTINGEN (WEST GERMANY). (ASSIGNEE).
Method and Apparatus for Purifying Sea Water,
W74-03654 3A

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN E.V. GOETTINGEN (WEST GERMANY). (ASSIGNEE).
System for Purification of Polluted Water,
W74-03655 5D

MCMASTER UNIV., HAMILTON (ONTARIO). DEPT. OF CHEMICAL ENGINEERING.
Simulation of a Petroleum Refinery Waste Treatment Process,
W74-03467 5D

METEOROLOGICAL OFFICE, POONA (INDIA).
A Study of Biotropism of Climate in Two Canadian Cities,
W74-03478 5C

METROPOLITAN COUNCIL OF THE TWIN CITIES AREA, MINN.
Metropolitan Development Guide: Protection Open Space--Policy Plan, Program.
W74-03635 6G

MIAMI UNIV., FLA. MARINE LAB.
The Role of Shell Material in the Natural Sand Replenishment Cycle of the Beach and Nearshore Area Between Lake Worth Inlet and the Miami Ship Channel,
W74-03610 2L

MIAMI UNIV., FLA. SEA GRANT INSTITUTIONAL PROGRAM.
Water Movements in Shallow Coastal Bays and Estuaries,
W74-03442 2L

MICHIGAN DEPT. OF PUBLIC HEALTH, LANSING.
Element Specific Gas Chromatographic Analyses of Organochlorine Pesticides in the Presence of PCB's by Selective Cancellation of Interfering Peaks,
W74-03589 5A

MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF CHEMISTRY, MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF ENTOMOLOGY.
Photochemistry of Bioactive Compounds. Kinetics of Selected s-Triazines in Solution,
W74-03582 5A

MINISTRY OF AGRICULTURE AND FORESTRY, HIRATSUKA (JAPAN). AGRICULTURAL ENGINEERING RESEARCH STATION.
Wave Decaying Due to Breaking,
W74-03683 8B

MINNESOTA UNIV., MINNEAPOLIS. DEPT. OF ECONOMICS.
Coming to Terms with Growth and the Environment,
W74-03465 6B

MISSISSIPPI POWER AND LIGHT CO., VICKSBURG.
Look, No Clarifier,
W74-03220 5F

MISSISSIPPI STATE UNIV., STATE COLLEGE. WATER RESOURCES RESEARCH INST.
Proceedings, Mississippi Water Resources Conference, 1973.
W74-03212 5B

MISSISSIPPI UNIV., UNIVERSITY.
Nitrogen, Phosporus and Other Chemicals in Sediments from Reservoirs in North Mississippi,
W74-03213 5B

MISSOURI UNIV., ROLLA. DEPT. OF GEOLOGICAL ENGINEERING.
Industrial Wastewater-Injection Wells in United States--Status of Use and Regulation, 1973,
W74-03355 5E

MITSUI MINING AND SMELTING CO. LTD., TOKYO (JAPAN). (ASSIGNEE).
Method of Separating Metals from Waste Water,
W74-03664 5D

MOFFAT AND NICHOLS, LONG BEACH, CALIF.
Case History of Mission Bay Inlet, San Diego, California,
W74-03366 8B

MONSANTO CO., ST. LOUIS, MO.
Determination of Trace Organics in Air and Water,
W74-03576 5A

MOSCOW STATE UNIV. (USSR). DEPT. OF BIOGEOGRAPHY.
The Formation of Phytocenoses on the Liberated Ground of Lake Sevan, (In Russian),
W74-03632 2H

MUSEUM NATIONAL D'HISTOIRE NATURELLE, PARIS (FRANCE). LABORATOIRE DE GEOLOGIE.
Importance of Diatoms in the Present Varve Deposition (Alternation of Annual Layers) of Green Lake (Near Fayetteville, N.Y.), Model of Confined Sedimentation, (In French),
W74-03577 2H

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, GREENBELT, MD. GODDARD SPACE FLIGHT CENTER.
A Multispectral Study of an Extratropical Cyclone with Nimbus 3 Medium Resolution Infrared Radiometer Data,
W74-03349 2B

NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT, INC., NEW YORK.
Recent Studies of Mercury Analysis Procedures for Mill Effluents,
W74-03542 5A

An Investigation of Atomic Absorption Analysis of Mill Effluent Metal Ion Content,
W74-03543 5A

Effect of Bark Addition on the Dewatering Properties of Biological Sludges.
W74-03544 5D

NATIONAL ENGINEERING SCIENCE CO., MCLEAN, VA.
The Effect of Currents on the Mass Transport of Progressive Water Waves,
W74-03455 2L

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO.
Gas Chromatographic Determination of Methyl Mercury in Fish, Sediment, and Water,
W74-03549 5A

NATIONAL INST. FOR MEDICAL RESEARCH, LONDON (ENGLAND).
Synchronous Cultures of Bacillus subtille Obtained by Filtration With Glass Fiber Filters,
W74-03599 5A

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA (ONTARIO). HYDRAULICS SECTION.
Mathematical Simulation of Bottom Sediment Motion by Waves,
W74-03698 2J

NATIONAL WATER QUALITY LAB., CINCINNATI, OHIO. NEWTON FISH TOXICOLOGY LAB.
Chronic Effect of Low pH on Fathead Minnow Survival, Growth and Reproduction,
W74-03288 5C

NATIONAL WATER QUALITY LAB., DULUTH, MINN.
Effects of Residual Chlorine on Aquatic Life,
W74-03298 5C

NATURAL RESOURCES DEFENSE COUNCIL, WASHINGTON, D.C. PROJECT ON CLEAN WATER.
Recycling on the Land: An Alternative for Water Pollution Control,
W74-03387 5D

Water Pollution Control Handbook--A Citizens Guide to the Federal Water Pollution Control Act Amendments of 1972--Volume II,
W74-03388 5G

NATURHISTORISKA RIKSMUSEET, STOCKHOLM (SWEDEN). SECTION FOR INVERTEBRATE ZOOLOGY.
Some Arctic Limnology and the Hibernation of Invertebrates and some Fishes in Sub-Zero Temperatures,
W74-03275 2H

NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
Water Waves From Underwater Explosions in Shallow Water, Part I: A Mathematical Model for Waves in Constant Depth and in Shoaling Water,
W74-03454 2L

NAVAL OCEANOGRAPHIC OFFICE, WASHINGTON, D.C.
Preliminary Results and Comparison of Dye Tracer Studies Conducted in Harbors, Estuaries, and Coastal Waters,
W74-03705 5B

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Long Wave Study of Monterey Bay,
W74-03615 2L

Surface Characteristics of Windrows,
W74-03618 2L

Some Technical and Economic Concerns Relating to Shipboard Pollution Abatement,
W74-03743 5D

NEVADA UNIV., RENO. DESERT RESEARCH INST.
User Attitudes Toward Water Quality and Price, Las Vegas Valley and Reno-Sparks, Nevada,
W74-03331 5G

NEW BRUNSWICK LAB. (AEC), N.J.
Titrimetric Determination of Uranium with Electrogenerated Vanadium (V),
W74-03564 2K

NEW HAMPSHIRE UNIV., DURHAM. WATER RESOURCES RESEARCH CENTER.
Verification of Groundwater Capital Costs,
W74-03338 4B

NEW YORK UNIV., N.Y.
The Pollution Content of American Trade,
W74-03490 5G

NIPPON OIL CO. LTD., TOKYO. (ASSIGNEE).
Method of Treating Oil-Containing Contaminated Drainage,
W74-03660 5D

NORGES TEKNISKE HOEGSKOLE, TRONDHEIM. RIVER AND HARBOR LAB.
Hydraulic Survey and Model Investigation of the Inner Rana Fjord,
W74-03701 2L

NORTH CAROLINA COOPERATIVE SPORT FISHERY UNIT, RALEIGH.
Toxicity of the Herbicide Kuron (Silvex) to Bluegill Eggs and Fry,
W74-03279 5C

NORTH CAROLINA DEPT. OF NATURAL AND ECONOMIC RESOURCES, WILMINGTON. OFFICE OF WATER AND AIR RESOURCES.
Feasibility Study of Liquid-Waste Injection into Aquifers Containing Salt Water, Wilmington, North Carolina,
W74-03362 5E

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF MICROBIOLOGY.
Role of Bacteria in Decomposition of Injected Liquid Waste at Wilmington, North Carolina,
W74-03246 5B

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF SOIL SCIENCE.
Organic Compounds in Soil Water of Some Ultisols of the Atlantic Coastal Plain,
W74-03494 2G

NORTH DAKOTA UNIV., GRAND FORKS. DEPT. OF BIOLOGY.
Biotic Character as Related to Stream Mineral Content,
W74-03317 5C

OAK RIDGE NATIONAL LAB., TENN.
Site Investigations for a Bedded-Salt Pilot Plant in Permian Basin,
W74-03249 5E

Processing and Analysis of Radioisotopic Sand Tracer (RIST) Study Data,
W74-03628 2J

OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF ZOOLOGY.
Half-Saturation Constants for Uptake of Nitrate and Ammonia By Reservoir Plankton,
W74-03299 5C

OREGON STATE UNIV., CORVALLIS. DEPT. OF OCEANOGRAPHY.
Predicted Flushing Times and Pollution Distribution in the Columbia River Estuary,
W74-03704 5B

ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, PARIS (FRANCE).
Analysis of Costs of Pollution Control.
W74-03486 5G

OSAKA UNIV. (JAPAN). DEPT. OF CIVIL ENGINEERING.
Transformation of Surges,
W74-03687 8B

OSLO UNIV. (NORWAY). DEPT. OF LIMNOLOGY.
Studies on Phytoplankton in Relation to its production and some Physical-Chemical Factors in Lake Svinsjoen,
W74-03284 5C

OTTO DURR K.G., STUTTGART (WEST GERMANY) (ASSIGNEE).
Method for Purifying Water,
W74-03652 5D

PENNWALT CORP., PHILADELPHIA, PA. (ASSIGNEE)
Control of Aquatic Plant Life,
W74-03653 4A

PETTY-RAY GEOPHYSICAL GROUP, SAN ANTONIO, TEX.
Feasibility Study of a Seismic Reflection Monitoring System for Underground Waste-Material Injection Sites,
W74-03230 5B

PHILLIPS PETROLEUM CO., BARTLESVILLE, OKLA. (ASSIGNEE).
Containing and Removing Oil Spills on Water,
W74-03670 3A

POLISH ACADEMY OF SCIENCES, PSZCZYNA. HYDROBIOLOGICAL STATION.
Bottom Macrofauna in the Goczalkowice Dam Reservoir in the Years 1965-1969,
W74-03271 5C

PORT OF MIAMI, FLA.
Private Compensation for Injuries Sustained by the Discharge of Oil from Vessels on the Navigable Waters of the United States: A Survey,
W74-03378 5G

PRAGUE DEPT. OF WATER TECHNOLOGY (CZECHOSLOVAKIA).
The Structure of Saprobic Communities,
W74-03746 2I

PROCTER AND GAMBLE CO., CINCINNATI, OHIO.
Two-Level Skip-Lot Sampling Plans - Operating Characteristic Properties,
W74-03291 7C

PUERTO RICO UNIV., MAYAGUEZ. WATER RESOURCES RESEARCH INST.
Comparative Analysis of Residential Water Use in Puerto Rico,
W74-03324 6D

Human Factors Involved in the Development of a Watershed in Yabucoa,
W74-03325 6B

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF CHEMISTRY.
Glass Transition with Negative Change in Expansion Coefficient,
W74-03741 1B

RAJASTHAN UNIV. JAIPUR (INDIA).
Edaphic Factors and Wilt of Coriander,
W74-03281 5C

READING UNIV. (ENGLAND).
Seasonal Changes in Population Density and Vertical Distribution of Prosobrance Veligers in Offshore Plankton at Plymouth,
W74-03300 5C

READING UNIV. (ENGLAND). DEPT. OF SOIL SCIENCE.
Is Phosphate Reduced to Phosphine in Waterlogged Soils,
W74-03523 2G

REGISTER AND CUMMINGS, ASHEVILLE, N.C.
Water and Sewer Study: Part 2 Plans and Programs, Summary Report Buncombe County, North Carolina.
W74-03645 5G

REILLY, LIKE AND SCHNEIDER, BABYLON, N.Y.
Tuning Down the GNP,
W74-03744 6G

RENSSELAER POLYTECHNIC INST., TROY, N.Y. FRESH WATER INST.
Organic Nutrient Factors Effecting Algal Growths,
W74-03326 5C

RESEARCH INSTITUTE FOR APPLIED MECHANICS, FUKUOKA (JAPAN).
Shock Pressure of Breaking Wave,
W74-03684 8B

RESOURCES FOR THE FUTURE, INC., WASHINGTON, D.C.
Aggregates and Externalities: Information Needs for Public Natural Resource Decision-Making,
W74-03474 6B

RHODE ISLAND UNIV., KINGSTON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Competitive Growth of Sewage Organisms,
W74-03567 5C

RHODE ISLAND UNIV., KINGSTON. NARRAGANSETT MARINE LAB.
The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism,
W74-03626 5C

ROBERT A. TAFT SANITARY ENGINEERING CENTER, CINCINNATI, OHIO.
Hydraulic Model Tests of Estuarial Waste Dispersion,
W74-03622 5B

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE, MIAMI, FLA.
Tropical Bay in Danger,
W74-03716 6G

Farming the Sea,
W74-03717 8I

ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Wave Set-Up on a Beach,
W74-03432 2E

RUTGERS - THE STATE UNIV., NEE BRUNSWICK, N.J. DEPT. OF SOILS AND CROPS.
Removal of Phosphate from Waste Water by Aluminum and Iron, Phase III,
W74-03208 5D

SAN ANTONIO RIVER AUTHORITY, TEX.
A Guide to Decision Making for Water Resources Management in the San Antonio Region.
W74-03484 6B

SANTA FE CITY PLANNING DEPT., N. MEX.
Water Study, Santa Fe Planning Area.
W74-03641 4B

SCHICK INTERNATIONAL, MORGAN, UTAH.
Agricultural Reconnaissance Supplement to the Mill Creek Development Project.
W74-03488 6D

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
Orbital Velocity Associated with Wave Action Near the Breaker Zone,
W74-03444 2J

Near-Shore Circulation in the California Current,
W74-03624 2L

Runup Recipe for Periodic Waves on Uniformly Sloping Beaches,
W74-03686 8B

SDL INST., TORONTO (ONTARIO).
A Planning Model for A Water Quality Management Agency,
W74-03469 5G

SEATTLE DEPT. OF WATER, WASH.
Emphasizing Quality Control,
W74-03636 5F

SENSHU UNIV., TOKYO (JAPAN).
A Petrographic Study on Littoral Drift Along the Ishikawa Coast, Japan,
W74-03692 2L

SHEFFIELD UNIV. (ENGLAND). DEPT. OF BOTANY.
Physiology of Drought Resistance in the Soybean Plant (Glycine max): I. The Relationship Between Drought Resistance and Growth,
W74-03475 3F

SHELL DEVELOPMENT CO., MODESTO, CALIF.
Characterization and Microdetermination of a Water-Soluble Metabolite from Bladex Herbicide by Conversion to 5,5-Dimethylhydantion,
W74-03587 5A

SHELL OIL CO., NEW YORK. (ASSIGNEE).
Sorbent Belt,
W74-03672 5G

SHINSHU UNIV., SUWA (JAPAN). SUWA HYDROBIOLOGICAL STATION.
Ecological Studies on Dissolved Oxygen and Bloom of Microcystis in Lake Suwa: I. Horizontal Distribution of Dissolved Oxygen in Relation to Drifting of Microcystis by wind,
W74-03524 5C

SOIL CONSERVATION SERVICE, JACKSON, MISS.
Environmental Aspects of Watershed Planning,
W74-03215 6G

SOIL CONSERVATION SERVICE, WASHINGTON, D.C.
Banklick Creek Watershed (Final Environmental Impact Statement).
W74-03398 4D

SOMERSET COUNTY PLANNING BOARD, SOMERVILLE, N.J.
Water Supply and Distribution.
W74-03647 6D

SOUTHEASTERN MASSACHUSETTS UNIV., NORTH DARTMOUTH. DEPT. OF CIVIL ENGINEERING.
Effects of Highways on Surface and Subsurface Waters,
W74-03607 4C

SOUTHWESTERN GREAT PLAINS RESEARCH CENTER, BUSHLAND, TEX.
Movement and Accumulation of Suspended Sediment During Basin Recharge,
W74-03240 4B

SOVETSKII NATSIONALNYI KOMITET PO PROVEDENIYU MEZHDUNARODNOI BIOLOGICHESKOI PROGRAMMY, MOSCOW (USSR).
Formation of the Annual Ring and the Accumulation of Organic Matter in Trees, (In Russian).
W74-03466 2I

SPRINGFIELD PLANNING DEPT., MASS.
Conservation-Open Space Plan; Amendments to the Springfield Comprehensive Plan.
W74-03634 3D

STANFORD UNIV., CALIF. DEPT. OF CIVIL ENGINEERING.
A Dynamic Programming--Simulation Strategy for the Capacity Expansion of Hydroelectric Power Systems,
W74-03470 8C

Analyzing the Environmental Impacts of Water Projects.
W74-03472 6G

STATE UNIV. COLL., OSWEGO, N.Y. LAKE ONTARIO ENVIRONMENTAL LAB.
Determination of Trichlorfon (0,0-Dimethyl (2,2,2-Trichloro-1-Hydroxyethyl)Phosphonate) in Forest Environmental Samples,
W74-03588 5A

STATE UNIV. COLL., PLATTSBURGH, N.Y. DEPT. OF BIOLOGICAL SCIENCES.
Toxicity of Lead Nitrate to Algae,
W74-03595 5C

SUEZ CANAL AUTHORITY RESEARCH CENTER, ISMAILIA (EGYPT).
Diffraction of Wind Generated Water Waves,
W74-03680 8B

SURREY UNIV., GUILFORD, (ENGLAND). DEPT. OF BIOLOGICAL SCIENCES.
The Construction of a Sand Profile Sampler: Its Use in the Study of the Vorticella Populations and the General Interstitial Microfauna of Slow Sand Filters,
W74-03286 5A

TAHAL CONSULTING ENGINEERS LTD., TEL AVIV (ISRAEL). DIV. OF HYDROLOGY.
Artificial Recharge of Coastal-Plain Aquifer in Israel,
W74-03356 4B

Dan Region, Israel, Sewage-Reclamation and Recharge Project,
W74-03359 5D

TECHNICAL UNIV. OF DENMARK, COPENHAGEN. COASTAL ENGINEERING LAB.
Wave Boundary Layers and Friction Factors,
W74-03678 8B

TECHNION - ISRAEL INST. OF TECH., HAIFA. DEPT. OF FOOD ENGINEERING.
Iodide Oxidation by a Marine Bacterium,
W74-03565 5A

TECHNISCHE UNIVERSITAET, DARMSTADT (WEST GERMANY). WASSER- UND ABWASSERFORSCHUNGSSTELLE.
Closed Water Circuits in a Paper Mill Processing Waste Paper,
W74-03540 5D

TEL-AVIV UNIV. (ISRAEL). DEPT. OF ECONOMICS.
The Optimal Time to Start the Operation of a Desalting Plant in Israel,
W74-03750 3A

TENNESSEE UNIV., KNOXVILLE. DEPT. OF AGRICULTURAL ENGINEERING.
The Effects of Surface Irrigation with Dairy Manure Slurries on the Quality of Groundwater and Surface Runoff,
W74-03339 5B

TENNESSEE VALLEY AUTHORITY, MUSCLE SHOALS, ALA. SOILS AND FERTILIZER RESEARCH BRANCH.
Monitoring Nutrient Losses from Small Watersheds,
W74-03219 5B

TETRA TECH, INC., PASADENA, CALIF.
Equilibrium Beach Profile Scale-Model Relationship,
W74-03457 2J

TEXAS A AND M UNIV., COLLEGE STATION. COASTAL AND OCEAN ENGINEERING DIV.
Numerical Calculation of Wave Refraction Digital Computer,
W74-03343 8B

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF OCEANOGRAPHY AND METEOROLOGY.
The Salinity Regime and Exchange Characteristics of a Shallow Coastal Bay System,
W74-03611 2L

TEXAS A AND M UNIV., COLLEGE STATION. INDUSTRIAL ECONOMICS RESEARCH DIV.
The Economic Impact of a Deepwater Terminal in Texas,
W74-03489 6B

TEXAS LAW INST. OF COASTAL AND MARINE RESOURCES, HOUSTON.
Selected Legal and Institutional Aspects of the Texas Coastal Zone.
W74-03630 6E

TEXAS TECH UNIV., LUBBOCK. DEPT. OF AGRICULTURAL ECONOMICS.
Economic Benefits from Irrigation,
W74-03487 6C

TEXAS UNIV. MEDICAL SCHOOL, SAN ANTONIO.
Toxicity Bioassay of Heavy Metals in Water Using Tetrahymena Pyriformis,
W74-03321 5C

TEXAS WATER DEVELOPMENT BOARD, AUSTIN.
Dams and Reservoirs in Texas: Part II,
W74-03375 8A

TOHOKU UNIV., SENDAI (JAPAN). GEOPHYSICAL INST.
The Generation of Edge Waves by Cylindrical Waves Impinging From the Outer Sea,
W74-03451 2E

TOKAI UNIV., TOKYO (JAPAN). COLL. OF MARINE SCIENCE AND TECHNOLOGY.
A Possibility of Generation of Surf Beats,
W74-03681 8B

TOKYO UNIV. (JAPAN). DEPT. OF CIVIL ENGINEERING.
Response Characteristics of Underwater Wave Guide,
W74-03677 8B

A Study on Wave Transformation Inside Surf Zone,
W74-03682 8B

TOKYO UNIV. (JAPAN). INST. OF APPLIED MICROBIOLOGY.
Investigation of the Energetics of Methane-Utilizing Bacteria in Methane- and Oxygen-Limited Chemostat Cultures,
W74-03601 5A

TOKYO UNIV. OF EDUCATION (JAPAN). FACULTY OF SCIENCE.
Underground Waste Disposal and Artificial Recharge in Japan,
W74-03226 5E

TORONTO UNIV. (ONTARIO). DEPT. OF MECHANICAL ENGINEERING.
Wind Driven Water Currents,
W74-03619 8B

TORONTO UNIV. (ONTARIO). DEPT. OF ZOOLOGY.
An In Situ Examination of the Grazing Activities of Natural Zooplankton Communities,
W74-03276 5C

TORONTO UNIV. (ONTARIO). INST. OF ENVIRONMENTAL SCIENCES AND ENGINEERING.
The Impact of Policy Variables on Residential Water Demand and Related Investment Requirements,
W74-03477 6D

UKRAINSKI NAUCHNO-ISSLEDOVATELSKII INSTITUTE BUMAGI, KIEV (USSR).
Apparatus for Automatic Control of Sediment Level (Pribor dlya avtomaticheskogo kontrolya urovnya osadka),
W74-03541 5D

UNION CARBIDE CORP., NEW YORK. (ASSIGNEE).
Phosphorous Removal from Wastewater,
W74-03667 5D

UNION CARBIDE CORP., TONAWANDA, N.Y. LINDE DIV.
Oxygen Activated Sludge Wastewater Treatment Systems: Design Criteria and Operating Experience,
W74-03496 5D

UNION COLL., SCHENECTADY, N.Y. DEPT. OF BIOLOGICAL SCIENCES.
DDT Inhibition of Active Chlorophenol Red Transport in Goldfish (Carassius auratus) Renal Tubules,
W74-03573 5C

UNITED STATES LAKE SURVEY, DETROIT, MICH.
Spectral Analysis of Shallow Water Waves in Lake Michigan,
W74-03439 2H

Winds, Wind Set-Ups, and Seiches on Lake Erie,
W74-03625 8B

UNIVERSITY COLL. OF SWANSEA (WALES). DEPT. OF GEOGRAPHY.
Limestone Springs and Individual Flood Events, (With Special Reference to the Gower Peninsula, Wales),
W74-03512 2F

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.
California Coastal Zone Conservation Act, Interim Permit Control, General,
W74-03379 6F

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. DEPT. OF GEOLOGY.
Dynamic Characteristics of West Florida Gulf Coast Beaches,
W74-03437 2J

UPPSALA UNIV. (SWEDEN). DEPT. OF QUATERNARY GEOLOGY.
A New Method for the Estimation of Absolute Microfossil Numbers, with Reference Especially to Diatoms,
W74-03285 5A

UTAH WATER RESEARCH LAB., LOGAN.
Detergent and Non-Detergent Phosphorus in Sewage,
W74-03606 5B

VEXILAR, INC., MINNEAPOLIS, MINN. (ASSIGNEE).
Circuit for Water Depth Meter,
W74-03666 7B

VIRGINIA INST. OF MARINE SCIENCE, GLOUCESTER POINT.
Larvae of the Burrowing Shrimp, Upogebia Affinis, (Crustacea, Decapoda, Upogebiidae) from Virginia Plankton,
W74-03303 2L

Mud Shrimp (Callianassa) Larvae (Crustacea, Decapoda, Callianassidae) from Virginia Plankton,
W74-03307 2L

An Inexpensive, Fast Response Current Speed Indicator,
W74-03310 7B

VORONEZHSKII LESOTEKHNICHESKII INSTITUT (USSR).
Some Data on Fluorine, Bromine, and Iodine Concentrations in Atmospheric Precipitation at Voronezh (Nekotoryye dannyye o soderzhanii ftora, broma i ioda v atmosfernykh osadkakh g. Voronezha),
W74-03251 5A

VYSOKA SKOLA CHEMICKO-TECHNOLOGICKA, PRAGUE (CZECHOSLOVAKIA). DEPT. OF WATER TECHNOLOGY.
The Reality of Three British Biotic Indices,
W74-03289 5A

VYZKUMNY USTAV CHEMICKYCH ZARIZENI, BRNO (CZECHOSLOVAKIA).
Power Input for the Surface Aerator in Waste Water Treatment Plants (Prikon povrchoveho aeracniho michadla pro cisteni odpadnich vod),
W74-03555 5D

WASHINGTON STATE UNIV., PULLMAN. DEPT. OF AGRICULTURAL ECONOMICS.
Economic Growth and Environmental Decay: The Solution Becomes the Problem,
W74-03492 6B

WASHINGTON UNIV., SEATTLE. COLL. OF FISHERIES.
The Feeding Ecology of the Rock Greenling, Hexagrammos lagocephalus, in the Inshore Waters of Amchitka Island, Alaska,
W74-03505 2I

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
An Instrumentation System to Measure Near-Bottom Conditions on the Continental Shelf,
W74-03353 2J

WASHINGTON UNIV., SEATTLE. FISHERIES RESEARCH INST.
A Limnology Study of a High Mountain Lake in Mount Rainier National Park, Washington State; USA,
W74-03277 5A

WATER RESOURCES BOARD, READING (ENGLAND).
Artificial Recharge in United Kingdom with Special Reference to London Basin,
W74-03225 4B

WATERLOO UNIV. (ONTARIO). DEPT. OF EARTH SCIENCES.
Hydrogeologic Studies at a Subsurface Radioactive-Waste-Management Site in West-Central Canada,
W74-03239 5E

WATERLOO UNIV. (ONTARIO). DEPT. OF PSYCHOLOGY.
A Sensitive Bio-Behavioral Assay for Methyl Mercury,
W74-03572 5A

WATERLOOPKUNDIG LABORATORIUM, DELFT (NETHERLANDS).
Transport Patterns in the Chao Phya Estuary,
W74-03693 2L

WESTERN AUSTRALIA UNIV., NEDLANDS. DEPT. OF CIVIL ENGINEERING.
Sediment Transport and Accretion Around the Coastlines of Japan,
W74-03690 2L

WESTERN MICHIGAN UNIV., KALAMAZOO. DEPT. OF GEOLOGY.
Beach Changes, on the Central Texas Coast Associated with Hurricane Fern, September, 1971,
W74-03433 2J

WISCONSIN UNIV., MADISON.
Floodplain Lands for Parks and Recreation: A Case Study of Milwaukee,
W74-03491 6B

WISCONSIN UNIV., MADISON. DEPT. OF BACTERIOLOGY.
Bacterial Decomposition Processes in Lake Wingra Sediments During Winter,
W74-03592 5A

WISCONSIN UNIV., MADISON. DEPT. OF BOTANY.
Field Studies on Photosynthesis of Cladophora Glomerata (Chlorophyta) in Green Bay, Lake Michigan,
W74-03274 5C

WISCONSIN UNIV., MADISON. DEPT. OF MATHEMATICS.
On Singular Boundary Value Problems for the EPD Equation,
W74-03617 2E

WISCONSIN UNIV., MADISON. DEPT. OF SOIL SCIENCE.
Effect of Phosphate and Chloride Salts on Ammonification in Waterlogged Soils,
W74-03445 2G

WISCONSIN UNIV., MADISON. MATHEMATICS RESEARCH CENTER.
Surface Wave Resonance on Continental and Island Slopes,
W74-03616 2E

WISCONSIN UNIV., MILWAUKEE. CENTER FOR GREAT LAKES STUDIES.
A Contribution to the Ecology and Distribution of Aquatic Acari in the St. Lawrence Great Lakes,
W74-03314 5C

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Carbon Dioxide and pH: Effects on Species Succession of Algae,
W74-03594 5C

Dissimilatory Reduction of Inorganic Sulfur by Facultatively Anaerobic Marine Bacteria,
W74-03597 5C

Ontogeny of a Salt Marsh Estuary,
W74-03621 2L

WYOMING STATE ENGINEER'S OFFICE, CHEYENNE. WATER PLANNING PROGRAM.
The Wyoming Framework Water Plan, A Summary.
W74-03742 6B

ACCESSION NUMBER INDEX

W74-03201 2F
W74-03202 2J
W74-03203 5C
W74-03204 6B
W74-03205 8A
W74-03206 5C
W74-03207 6F
W74-03208 5D
W74-03209 5C
W74-03210 5C
W74-03211 5C
W74-03212 5B
W74-03213 5B
W74-03214 2J
W74-03215 6G
W74-03216 2E
W74-03217 5B
W74-03218 5B
W74-03219 5B
W74-03220 5F
W74-03221 5D
W74-03222 5E
W74-03223 5D
W74-03224 5E
W74-03225 4B
W74-03226 5E
W74-03227 5E
W74-03228 5E
W74-03229 5E
W74-03230 5B
W74-03231 5E
W74-03232 5C
W74-03233 5B
W74-03234 5B
W74-03235 5B
W74-03236 4B
W74-03237 4B
W74-03238 5B
W74-03239 5E
W74-03240 4B
W74-03241 5E
W74-03242 5E
W74-03243 5E
W74-03244 5E
W74-03245 5E
W74-03246 5B
W74-03247 5E
W74-03248 5E
W74-03249 5E
W74-03250 5E
W74-03251 5A
W74-03252 2K
W74-03253 5B
W74-03254 2K
W74-03255 2K
W74-03256 2K
W74-03257 5B
W74-03258 2K
W74-03259 2E
W74-03260 2C
W74-03261 8I
W74-03262 8I
W74-03263 8I
W74-03264 8I
W74-03265 8I
W74-03266 8I
W74-03267 8I
W74-03268 8I
W74-03269 8I
W74-03270 8I
W74-03271 5C
W74-03272 5B
W74-03273 5A
W74-03274 5C
W74-03275 2H
W74-03276 5C
W74-03277 5A
W74-03278 5C
W74-03279 5C
W74-03280 5C
W74-03281 5C
W74-03282 5C
W74-03283 5A
W74-03284 5C
W74-03285 5A
W74-03286 5A
W74-03287 5B
W74-03288 5C
W74-03289 5A
W74-03290 7B
W74-03291 7C
W74-03292 7C
W74-03293 5F
W74-03294 5A
W74-03295 5A
W74-03296 5C
W74-03297 5C
W74-03298 5C
W74-03299 5C
W74-03300 5C
W74-03301 5C
W74-03302 5A
W74-03303 2L
W74-03304 2L
W74-03305 5C
W74-03306 3F
W74-03307 2L
W74-03308 5C
W74-03309 5A
W74-03310 7B
W74-03311 2K
W74-03312 2K
W74-03313 7B
W74-03314 5C
W74-03315 7B
W74-03316 5A
W74-03317 5C
W74-03318 5A
W74-03319 2I
W74-03320 5C
W74-03321 5C
W74-03322 5G
W74-03323 5G
W74-03324 6D
W74-03325 6B
W74-03326 5C
W74-03327 5B
W74-03328 5B
W74-03329 5D
W74-03330 5A
W74-03331 5G
W74-03332 6B
W74-03333 2B
W74-03334 4A
W74-03335 4B
W74-03336 4B
W74-03337 5D
W74-03338 4B
W74-03339 5B
W74-03340 5G
W74-03341 2J
W74-03342 2L
W74-03343 8B
W74-03344 2L
W74-03345 2L
W74-03346 5G
W74-03347 2L
W74-03348 2L
W74-03349 2B
W74-03350 2J
W74-03351 2L
W74-03352 2J
W74-03353 2J
W74-03354 4B
W74-03355 5E
W74-03356 4B
W74-03357 5E
W74-03358 5E
W74-03359 5D
W74-03360 4B
W74-03361 5E
W74-03362 5E
W74-03363 8B
W74-03364 2J
W74-03365 2L
W74-03366 8B
W74-03367 2J
W74-03368 2J
W74-03369 2J
W74-03370 8A
W74-03371 8C
W74-03372 8B
W74-03373 7B
W74-03374 2J
W74-03375 8A
W74-03376 5G
W74-03377 6E
W74-03378 5G
W74-03379 6F
W74-03380 6E
W74-03381 5G
W74-03382 5G
W74-03383 5G
W74-03384 6E
W74-03385 6E
W74-03386 5G
W74-03387 5D
W74-03388 5G
W74-03389 6E
W74-03390 6E
W74-03391 6E
W74-03392 6E
W74-03393 6E
W74-03394 6E
W74-03395 6E
W74-03396 6E
W74-03397 6F
W74-03398 4D
W74-03399 6E
W74-03400 6E
W74-03401 6E
W74-03402 6E
W74-03403 6E
W74-03404 6E
W74-03405 6E
W74-03406 6E
W74-03407 6E
W74-03408 6E
W74-03409 6G
W74-03410 6E
W74-03411 6E
W74-03412 6E
W74-03413 6E
W74-03414 6E
W74-03415 6E
W74-03416 6E
W74-03417 6E
W74-03418 6E
W74-03419 6E
W74-03420 5G
W74-03421 6E
W74-03422 6E
W74-03423 6E
W74-03424 6E
W74-03425 6E
W74-03426 6E
W74-03427 6E
W74-03428 6E
W74-03429 6E
W74-03430 6E
W74-03431 2J
W74-03432 2E
W74-03433 2J
W74-03434 2L
W74-03435 2L
W74-03436 2L
W74-03437 2J
W74-03438 5B
W74-03439 2H
W74-03440 2E
W74-03441 2J
W74-03442 2L
W74-03443 2L
W74-03444 2J
W74-03445 2G
W74-03446 2J
W74-03447 2J
W74-03448 2L
W74-03449 2L
W74-03450 2L
W74-03451 2E
W74-03452 2E
W74-03453 2L
W74-03454 2L
W74-03455 2L
W74-03456 2J
W74-03457 2J
W74-03458 2E
W74-03459 2L
W74-03460 2J
W74-03461 2L
W74-03462 2J
W74-03463 6E
W74-03464 6B
W74-03465 6B
W74-03466 2I
W74-03467 5D
W74-03468 5D
W74-03469 5G
W74-03470 8C
W74-03471 3F
W74-03472 6G
W74-03473 6C
W74-03474 6B
W74-03475 3F
W74-03476 6B
W74-03477 6D
W74-03478 5C
W74-03479 5G
W74-03480 6D
W74-03481 6B
W74-03482 5D
W74-03483 4A
W74-03484 6B
W74-03485 5G
W74-03486 5G
W74-03487 6C
W74-03488 6D
W74-03489 6B
W74-03490 5G
W74-03491 6B
W74-03492 6B
W74-03493 6B
W74-03494 2G
W74-03495 5D
W74-03496 5D
W74-03497 5D
W74-03498 5D
W74-03499 5D
W74-03500 5D
W74-03501 6A
W74-03502 6B
W74-03503 6B
W74-03504 5G
W74-03505 2I
W74-03506 2E
W74-03507 5A
W74-03508 2D
W74-03509 7B
W74-03510 7B
W74-03511 7B
W74-03512 2F

W74-03513 2J
W74-03514 2J
W74-03515 3F
W74-03516 3F
W74-03517 4C
W74-03518 5D
W74-03519 2D
W74-03520 5D
W74-03521 5D
W74-03522 7B
W74-03523 2G
W74-03524 5C
W74-03525 2K
W74-03526 2K
W74-03527 2K
W74-03528 2K
W74-03529 2K
W74-03530 2L
W74-03531 2H
W74-03532 2H
W74-03533 2K
W74-03534 2K
W74-03535 2H
W74-03536 5C
W74-03537 5C
W74-03538 5B
W74-03539 1A
W74-03540 5D
W74-03541 5D
W74-03542 5A
W74-03543 5A
W74-03544 5D
W74-03545 5D
W74-03546 5D
W74-03547 5D
W74-03548 5D
W74-03549 5A
W74-03550 4A
W74-03551 4C
W74-03552 5B
W74-03553 5A
W74-03554 5D
W74-03555 5D
W74-03556 5D
W74-03557 5A
W74-03558 5G
W74-03559 5B
W74-03560 5C
W74-03561 5B
W74-03562 5A
W74-03563 5A
W74-03564 2K
W74-03565 5A
W74-03566 5A
W74-03567 5C
W74-03568 5A
W74-03569 5A
W74-03570 5A
W74-03571 5C
W74-03572 5A
W74-03573 5C
W74-03574 5C
W74-03575 5A
W74-03576 5A
W74-03577 2H
W74-03578 5A
W74-03579 5A
W74-03580 2K
W74-03581 7C
W74-03582 5A
W74-03583 5B
W74-03584 5C
W74-03585 5B
W74-03586 5A
W74-03587 5A
W74-03588 5A
W74-03589 5A
W74-03590 5A
W74-03591 5C
W74-03592 5A
W74-03593 5B
W74-03594 5C
W74-03595 5C
W74-03596 5B
W74-03597 5C
W74-03598 5C
W74-03599 5A
W74-03600 5B
W74-03601 5A
W74-03602 5B
W74-03603 5C
W74-03604 2I
W74-03605 3F
W74-03606 5B
W74-03607 4C
W74-03608 2J
W74-03609 2J
W74-03610 2L
W74-03611 2L
W74-03612 8B
W74-03613 8B
W74-03614 8B
W74-03615 2L
W74-03616 2E
W74-03617 2E
W74-03618 2L
W74-03619 8B
W74-03620 2E
W74-03621 2L
W74-03622 5B
W74-03623 8B
W74-03624 2L
W74-03625 8B
W74-03626 5C
W74-03627 2E
W74-03628 2J
W74-03629 3D
W74-03630 6E
W74-03631 6F
W74-03632 2H
W74-03633 4C
W74-03634 3D
W74-03635 6G
W74-03636 5F
W74-03637 5G
W74-03638 5D
W74-03639 5G
W74-03640 5D
W74-03641 4B
W74-03642 6B
W74-03643 6B
W74-03644 6B
W74-03645 5G
W74-03646 5C
W74-03647 6D
W74-03648 3D
W74-03649 4B
W74-03650 3D
W74-03651 5D
W74-03652 5D
W74-03653 4A
W74-03654 3A
W74-03655 5D
W74-03656 5D
W74-03657 5D
W74-03658 5D
W74-03659 5D
W74-03660 5D
W74-03661 5G
W74-03662 5F
W74-03663 4A
W74-03664 5D
W74-03665 4A
W74-03666 7B
W74-03667 5D
W74-03668 5D
W74-03669 8C
W74-03670 3A
W74-03671 5D
W74-03672 5G
W74-03673 2E
W74-03674 8B
W74-03675 8B
W74-03676 8B
W74-03677 8B
W74-03678 8B
W74-03679 8B
W74-03680 8B
W74-03681 8B
W74-03682 8B
W74-03683 8B
W74-03684 8B
W74-03685 8B
W74-03686 8B
W74-03687 8B
W74-03688 8B
W74-03689 8B
W74-03690 2L
W74-03691 2L
W74-03692 2L
W74-03693 2L
W74-03694 8B
W74-03695 8B
W74-03696 2L
W74-03697 2J
W74-03698 2J
W74-03699 8B
W74-03700 8B
W74-03701 2L
W74-03702 2L
W74-03703 2L
W74-03704 5B
W74-03705 5B
W74-03706 2L
W74-03707 2L
W74-03708 2J
W74-03709 2J
W74-03710 6E
W74-03711 5G
W74-03712 5C
W74-03713 2L
W74-03714 5G
W74-03715 5C
W74-03716 6G
W74-03717 8I
W74-03718 6G
W74-03719 5C
W74-03720 6G
W74-03721 2D
W74-03722 6E
W74-03723 6E
W74-03724 6E
W74-03725 6E
W74-03726 6E
W74-03727 6E
W74-03728 6E
W74-03729 6G
W74-03730 6E
W74-03731 6E
W74-03732 6E
W74-03733 6E
W74-03734 6E
W74-03735 6E
W74-03736 6E
W74-03737 2K
W74-03738 2K
W74-03739 4A
W74-03740 1B
W74-03741 1B
W74-03742 6B
W74-03743 5D
W74-03744 6G
W74-03745 6B
W74-03746 2I
W74-03747 6B
W74-03748 6B
W74-03749 5G
W74-03750 3A

ABSTRACT SOURCES

Source	Accession Number	Total
A. Centers of Competence		
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W74-03271 -- 03280 03282 -- 03305 03307 -- 03321 03559 -- 03576 03578 -- 03597 03599 -- 03603 03606 -- 03607	94
Cornell University, Policy Models for Water Resources Systems	W74-03467 -- 03471	5
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W74-03539 -- 03549 03551 03553 -- 03557	17
University of Florida, Eastern U.S. Water Law	W74-03322 -- 03323 03376 -- 03430 03558 03710 -- 03714 03716 -- 03718 03720 03722 -- 03736	82
University of North Carolina, Metropolitan Water Resources Planning and Management	W74-03629 -- 03631 03633 -- 03645 03647 -- 03650	20
University of Wisconsin, Eutrophication	W74-03536 -- 03538	3
University of Wisconsin, Water Resources Economics	W74-03324 -- 03325 03331 -- 03332 03464 -- 03465 03472 -- 03474 03476 -- 03477 03479 -- 03481 03483 -- 03493 03495 -- 03504 03743 -- 03745 03747 -- 03750	42
U. S. Geological Survey, Hydrology	W74-03212 -- 03270 03340 03349 -- 03375 03505 -- 03514 03518 03520 -- 03521 03525 -- 03535	111
B. State Water Resources Research Institutes		
Georgia Environmental Resources Center	W74-03203, 03463 03737 -- 03738	4
Idaho Water Resources Research Institute	W74-03739	1
Indiana Water Resources Research Center	W74-03740 -- 03741	2

ABSTRACT SOURCES

Source	Accession	Total
B. State Water Resources Research Institutes (Cont'd)		
Iowa State Water Resources Research Institute	W74-03202 03209 – 03211	4
Kentucky Water Resources Research Institute	W74-03204 – 03206 03334	4
Louisiana Water Resources Research Institute	W74-03335 – 03337	3
Massachusetts Water Resources Research Center	W74-03207	1
New Hampshire Water Resources Research Center	W74-03338	1
New Jersey Water Resources Research Institute	W74-03208	1
Ohio Water Resources Center	W74-03201	1
Tennessee Water Resources Research Center	W74-03339	1
Wyoming Water Resources Research Institute	W74-03742	1
C. Other		
BioSciences Information Service	W74-03281, 03306 03346, 03438 03445, 03466 03475, 03478 03482, 03494 03515 – 03517 03519 03522 – 03524 03550, 03552 03577, 03598 03604 – 03605 03632, 03646 03715, 03719 03721, 03746	29
Environmental Protection Agency	W74-03326 – 03330	5
Ocean Engineering Information Service	W74-03341 – 03345 03347 – 03348 03431 – 03437 03439 – 03444 03446 – 03462 03608 – 03628 03673 – 03709	95
Ocean Engineering Information Service (Patents)	W74-03651 – 03672	22
Office of Water Resources Research	W74-03333	1

☆ U. S. GOVERNMENT PRINTING OFFICE : 1974 542-957/20

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

Subject Fields

- 1 NATURE OF WATER
- 2 WATER CYCLE
- 3 WATER SUPPLY AUGMENTATION AND CONSERVATION
- 4 WATER QUANTITY MANAGEMENT AND CONTROL
- 5 WATER QUALITY MANAGEMENT AND PROTECTION
- 6 WATER RESOURCES PLANNING
- 7 RESOURCES DATA
- 8 ENGINEERING WORKS
- 9 MANPOWER, GRANTS, AND FACILITIES
- 10 SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

- SUBJECT INDEX
- AUTHOR INDEX
- ORGANIZATIONAL INDEX
- ACCESSION NUMBER INDEX
- ABSTRACT SOURCES

AN EQUAL OPPORTUNITY EMPLOYER

JOHN LITTLEWOOD
DOCUMENTS DIVISION
220-D LIBRARY

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
Springfield, Va 22151

OFFICIAL BUSINESS
PRINTED MATTER

016.33371
Se48

THE LIBRARY OF THE
1974
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 8
APRIL 15, 1974

W74-03751 -- W74-04300

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

SELECTED WATER RESOURCES ABSTRACTS is available to Federal agencies, contractors, or grantees in water resources upon request to: Manager, Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior, Washington, D. C. 20240.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from the National Technical Information Service. Annual subscription is $45 (domestic), $56.25 (foreign). Certain documents abstracted in this journal can be purchased from the NTIS at prices indicated in the entry. Prepayment is required.

SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

VOLUME 7, NUMBER 8
APRIL 15, 1974

W74-03751 -- W74-04300

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD_____iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

THE INTERACTION OF WATER WITH ORGANIC SOLUTE SPECIES,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
C. L. Liotta, H. P. Hopkins, Jr., and M. Perdue.
Availability from NTIS as PB-227 250 $5.00 in paper copy, $1.45 in microfiche. Report ERC-1473, Sept 1973, 140 p, 10 fig, 12 tab, 101 ref, 1 append. OWRR B-049-GA(10). 14-31-0001-3269.

Descriptors: *Physiochemical properties, *Entropy, *Enthalpy, *Thermal properties, Thermodynamic behavior, Ionization, *Phenols, Aqueous solutions, *Organic acids.
Identifiers: *Gibbs free energy, Anilinium, Pyridinium, Organic bases.

A detailed investigation was made of the relative contributions of the enthalpy and entropy of ionization to the Gibbs free energies of ionization of substituted anilinium ions, pyridinium ions, and thiophenol. Enthalpies of ionization were determined calorimetrically in aqueous solution. Entropies of ionization were calculated from the experimental enthalpies and literature Gibbs free energies. The experimental data for substituted anilinium ions and pyridinium ions showed that plots of Gibbs free energies of ionization versus Enthalpies of ionization and Gibbs free energies of ionization versus Entropies of ionization were linear for both acid systems. The slopes of the plots for both anilinium ions and pyridinium ions indicate that substituent effects are manifested primarily in the enthalpy rather than the entropy of ionization. In contrast, substituent effects in the ionization of neutral organic acids such as phenols and benzoic acids are primarily due to entropy changes. A comparison of the thermodynamics of ionization of thiophenol and phenol reveals that the greater acidity of thiphenol is primarily due to a more positive entropy of ionization. Furthermore, a comparison of the aqueous and gas phase thermodynamic functions shows that the more positive entropy of ionization of thiophenol is almost entirely due to 'looser' solvation of the thiophenoxide anion in aqueous solution. Detailed methods are presented that will allow the sanitary engineer to estimate the thermodynamic properties of many classes of organic acids and bases in water at any temperature and pressure.
W74-03762

2. WATER CYCLE

2A. General

WATER RESOURCES NEWSLETTER, JUNE 1973.
Australian Water Resources Council, Canberra.
For primary bibliographic entry see Field 4A.
W74-03774

PROBLEMS IN MATHEMATICAL MODELING OF HYDROLOGIC PROCESSES (VOPROSY MATEMATICHESKOGO MODELIROVANIYA GIDROLOGICHESKIKH PROTSESSOV).
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Gosudarstvennyi Gidrologicheskiy Institut Trudy, No 211, M. S. Grushevskiy, editor, Leningrad, 1973. 228 p.

Descriptors: *Hydrology, *Mathematical models, *Model studies, Analog models, Computers, Linear programming, Optimization, Probability, Stochastic processes, Time series analysis, Streamflow, Runoff, Hydrographs, Unit hydrographs, Floods, Watersheds(Basins), Meteorology, Effective precipitation, Snowmelt, Waves(Water), Equations, *Open channels.
Identifiers: USSR.

Use of mathematical models in hydrology is discussed in this collection of 11 papers published by the Leningrad State Hydrologic Institute. Problems in mathematical modeling of streamflow and other hydrologic processes are examined, and linear and more complex models are used to construct flood-discharge hydrographs and to compute maximum runoff on watersheds in the Maritime Territory. Transformation of complex waves in open channels and development of wind waves are described, and a genetic method is proposed for calculating channel storage in a river reach. Fundamentals of the crossing theory are explained, and possibilities of its direct application to study of meteorological processes and to time series analysis are considered. (Josefson-USGS)
W74-03830

UNCERTAINTIES IN HYDROLOGIC MODELS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
S. Ince.
In: Proceedings of International Symposium on Uncertainties in Hydrologic and Water Resources Systems, December 11-14, 1972, Tucson, Arizona, Volume III, p 934-939. (1973).

Descriptors: *Model studies, *Hydraulic similitude, *Risks, *Testing, Variability, Physical models, Simulation, Design, Engineering, Calibrations, Projects, Project planning.

Hydraulic models are frequently employed in arid areas to find analytical answers to design problems. Although numerical solutions to such problems using the digital computer are becoming abundant, there are problems which still lend themselves to hydraulic models, including certain mobile bed fluvial hydraulic problems significant in arid regions. The successful use of these models for engineering design purposes depends a great deal upon the exposure, interpretation, and resolution of uncertainties at each step of the study, namely model calibration, model validation, and experimentation with the model. For the model calibration step, three sources of uncertainties are those about the modeling parameters, in the prototype data, and in the instrumentation. The validation of the model is subject to the same uncertainties but usually suffers also from the fact that all data have been used in some form or another for the calibration and there is not sufficient time to collect additional data. Nevertheless, instrumentation of hydraulic models has reached great heights of sophistication. Most of the variables can be measured with great precision, and control of the model, data acquisition and processing can be done by computers. While not cheap, it still requires field surveys and competent investigators. (Muller-Arizona)
W74-03916

THE ROLE OF MOORS IN GROUNDWATER RECHARGE (DIE ROLLE DER MOORE BEI DER GRUNDWASSERNEUBILDUNG),
Ausseninstitut fuer Moorforschung und Angewandte Bodenkunde, Bremen (West Germany).
For primary bibliographic entry see Field 2F.
W74-04251

WATER QUALITY CYCLE--REFLECTION OF ACTIVITIES OF NATURE AND MAN,
California State Dept. of Water Resources, Los Agneles. Southern District.
For primary bibliographic entry see Field 5B.
W74-04263

2B. Precipitation

PRECIPITATION AS A NUTRIENT AND HYDROGEN ION SOURCE FOR FORESTED WATERSHEDS IN THE MISSOULA VICINITY,
Montana Univ., Missoula. School of Forestry.
For primary bibliographic entry see Field 5B.
W74-03766

INVESTIGATION OF THE EFFECTS OF URBANIZATION ON PRECIPITATION TYPE, FREQUENCY, AREAL AND TEMPORAL DISTRIBUTION, PHASE II,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Institute.
For primary bibliographic entry see Field 4C.
W74-03768

STORMS CAUSING HARBOR AND SHORELINE DAMAGE THROUGH WIND AND WAVES NEAR MONTEREY, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2J.
W74-04208

FINE STRUCTURE MEASUREMENT OF TEMPERATURE AND MOISTURE OVER THE MONTEREY BAY,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2L.
W74-04222

STATISTICAL CHARACTERISTICS OF THUNDERSTORMS IN YAKUTSK ASSR (STATISTICHESKIYE KHARAKTERISTIKI GROZ YAKUTII),
Institute of Geography of Siberia and the Far East, Irkutsk (USSR).
A. Kh. Filippov, and D. F. Khutoryanskaya.
Institut Geograffi Sibiri i Dal'nego Vostoka Doklady, No 31, p 39-46, 1971. 3 fig, 3 tab, 5 ref.

Descriptors: *Thunderstorms, *Statistics, *Statistical methods, Probability, Variability, Time, Frequency, Distribution patterns, Orography, Meteorology, Air masses, Fronts(Atmospheric), Maps, Equations.
Identifiers: *USSR(Yakutsk).

The Yakutsk Autonomous Soviet Socialist Republic is located in an area of relatively low thunderstorm activity. The number of thunderstorm days per year ranges from 0.1 in the far north to 19-20 in southern mountainous regions. Three regions of high thunderstorm activity were identified: (1) the southern mountainous part of the republic, where the number of thunderstorm days per year is 18-19; (2) the mountainous and piedmont parts of the Verkhoyansk mountain range, where the number of thunderstorm days per year is 9-10; and (3) the southeastern mountainous part of the republic, where the number of thunderstorm days per year is 9-10. Two regions of relatively low thunderstorm activity are associated with low-lying areas and are located in river valleys. These are the middle part of the Lena River Valley, where the number of thunderstorm days per year is 5-8, and the region of the Oymyakon Depression, where the number of thunderstorm days per year is 6. Total time duration of a thunderstorm varies widely from 38 hours in southern mountainous regions to 2-3 hours in the northern part of the Republic. Maximum thunderstorm activity occurs in July with the number of thunderstorm days usually varying from 2-4 in the north to 8 in southern regions. In April and September, thunderstorms are extremely rare and occur, on the average, once every 10-20 years. Maxium time duration of a thunderstorm occurs in July, ranging from 1-2 hours per month in northern regions to 15 hours per month in the south. Distribution of the number of thunderstorm days and

of the time duration of thunderstorms per year is mapped, and confidence limits for the average number of thunderstorm days at 8 stations and statistical parameters of thunderstorms at 18 stations in the Republic are tabulated. (Josefson-USGS)
W74-04253

SOME CAUSES OF FAILURE IN THE CLOSENESS OF CORRELATIVE CONNECTION BETWEEN TREE SPECIES TRANSPIRATION AND METEOROLOGICAL FACTORS, (IN RUSSIAN),
For primary bibliographic entry see Field 2D.
W74-04283

2C. Snow, Ice, and Frost

ALASKA WATER RESOURCES RESEARCH NEEDS FOR THE 70'S.
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 6B.
W74-03757

WATER BALANCE OF A SMALL LAKE IN A PERMAFROST REGION,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 2H.
W74-03758

INTEGRATED MEASUREMENT OF SOIL MOISTURE BY USE OF RADIO WAVES,
Utah State Univ., Logan. Coll. of Engineering.
D. G. Chadwick.
Available from the National Technical Information Service as PB-227 242; $4.00 in paper copy, $1.45 in microfiche. Utah State University, Logan, Utah Water Research Laboratory Publication PRWG103-1. Completion Report. November 1973. 87 p, 34 fig, 3 tab, 8 ref, append. OWRR B-062-UTAH(2). 14-31-0001-3657.

Descriptors: *Soil moisture, *Radio waves, Dielectric, Conductivity, Measurement, Instrumentation, Electronic equipment.
Identifiers: *Measurement accuracy.

An integrated value of soil moisture can be determined by measuring the attenuation of vertically-polarized surface radio waves that are propogated over the ground between a transmitting and receiving antenna. Soil moisture values in the root-zone region were measured over longitudinal distances typically ranging from 50 feet to 600 feet with good results. Integrated soil moisture measurements over greater distances are also possible. The received field strength of propagated radio surface waves closely matches theoretical calculations. The measurement is easily made and does not disturb the soil. Dense, green vegetation, such as alfalfa or corn, causes errors in measurement accuracy. Less dense vegetation, such as range land, does not seriously affect measurement accuracy. The described equipment is portable and can be used by an unskilled operator.
W74-03772

THE WATER-ICE PHASE COMPOSITION OF CLAY-WATER SYSTEMS: I. THE KAOLINITE-WATER SYSTEM,
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 2G.
W74-03783

DATA OF GLACIOLOGICAL STUDIES. CHRONICLE AND DISCUSSIONS (MATERIALY GLYATSIOLOGICHESKIKH ISSLEDOVANIY. KHRONIKA, OBSUZHDENIYA).
Akademiya Nauk SSSR, Moscow. Institut Geografii.
Materialy glyatsiologicheskikh issledovaniy. Khronika, Obsuzhdeniya, No 19, G. A. Avsyuk, and V. M. Kotlyakov, editors, Moscow, January 1972. 324 p.

Descriptors: *Glaciology, *Glaciation, *Glaciers, *Mountains, Alpine, Ice, Snowpacks, Avalanches, Runoff, Movement, Melting, Glaciohydrology, Glacial drift, Arctic, Antarctic, Meteorology, Investigations, Conferences, Maps, Equations.
Identifiers: *USSR, Glacier mass balance, Paleoglaciology, Icings.

This issue is the 19th collection of articles on 'Data of Glaciological Studies' in the series 'Chronicle and Discussions,' published by the Department of Glaciology of the USSR Academy of Science's Institute of Geography. Subjects discussed include: (1) report on glaciological investigations in the USSR in 1967-70; (2) glaciology at the Fifteenth General Assembly of the International Union of Geodesy and Geophysics; (3) mechanism of glacier pulsations; (4) map of annual river runoff in the Pamirs and Pamir-Alay Mountains; (5) heat balance on the surface of Marukha Glacier; (6) modern and ancient glaciers in the Suntar-Khayata Mountains; (7) history of development of the Antarctic glacier cover; (8) general outline of Upper Quaternary and historic glaciations in the Caucasus and Tien Shan; (9) changes in ice volume of Fedchenko Glacier over a 30-year period (1928-58); (10) effects of phase composition and structure of sea ice on its elastic and dielectric properties; (11) design of snow-retaining structures and terraces on avalanche-risk slopes of railway lines; (12) distance of avalanche flowage as a function of snow density; (13) techniques in investigations of glacier fluctuations; (14) observations in a representative glacier basin of the Bol'shaya Khadata River in 1969-70; (15) icings in the Suntar-Khayata Mountains; (16) avalanches and their role in the nourishment of the Inyl'chek Glacier; and (17) modern glaciers in mountains of Central Asia. (See also W74-03836) (Josefson-USGS)
W74-03835

A MAP OF ANNUAL RIVER RUNOFF IN THE PAMIRS AND PAMIR-ALAY MOUNTAINS (KARTA GODOVOGO STOKA REK PAMIRA I PAMIRO-ALAYA),
For primary bibliographic entry see Field 2E.
W74-03836

A LANDSCAPE ZONATION FOR THE SOUTHERN AND CENTRAL MACKENZIE RIVER VALLEY BASED ON TERRAIN PERMAFROST CHARACTERISTICS,
Northern Forest Research Center, Edmonton (Alberta).
C. B. Crampton.
Canadian Journal of Earth Sciences, Vol 10, No 12, p 1843-1854, December 1973. 7 fig, 1 tab, 5 ref.

Descriptors: *Permafrost, *Terrain analysis, Soil-water-plant relationships, Paleoclimatology, Geomorphology, Aerial photography, *Canada, *Soil types.
Identifiers: Mackenzie River valley.

A landscape zonation is presented for the southern and central Mackenzie River valley, based on observed changes in permafrost characteristics of selected terrain types, with changing climatic implications. The relative abundance of lichen on specified terrain types suggests the thickness of the active layer within the discontinuous permafrost zone, and is a useful guide in air photograph interpretation for extensive mapping of landscape-permafrost relationships between localities of ground inspection. Widespread, fossil, cryoturbated terrain supports the contention that today's climate in the study area is less severe than that in the past. (Knapp-USGS)
W74-04266

2D. Evaporation and Transpiration

WATER VAPOR MOVEMENT THROUGH MULCHES UNDER FIELD CONDITIONS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2G.
W74-03784

A RESISTANCE MODEL TO PREDICT EVAPOTRANSPIRATION AND ITS APPLICATION TO A SUGAR BEET FIELD,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
K. W. Brown, and N. J. Rosenberg.
Agronomy Journal, Vol 65, p 341-347, May-June 1973. 7 fig, 1 tab, 29 ref. OWRR A-017-NEB(1).

Descriptors: *Evapotranspiration, *Water loss, *Latent heat, Energy Budget, Energy transfer, Consumptive use, Transpiration, Heat balance, Radiation, Heat budget, Model studies, *Resistance networks, Evaporation, *Sugar beets, *Nebraska.

Procedures to project detailed micrometeorological and lysimetric determinations of evaporation and its dependence on the microclimate and crop factors to fields where such measurements have not been conducted are required. The dependence of latent heat flux of a crop on crop resistance, air resistance, air temperature, water vapor pressure and net incident radiation less soil heat flux was evaluated in a Nebraska field employing an electrical resistance analogue of the energy transfer process and an energy balance equation. The inherent difficulties in model application to both the single leaf and the crop are discussed. In applying the resistance model to a field crop the primary problem may be that sources and sinks of heat flux are not necessarily identical within the crop system. Hourly latent heat predicted by the model and that determined by energy balance generally agree within 5%, and daily totals agree in all cases. Sugar beet crop evapotranspiration is thus successfully modeled by this method. As more detailed data on experimental fields becomes available, the model may prove useful in application to extensive vegetated areas as well as being employed in larger models of total hydrologic systems where evapotranspiration is an important component. (Muller-Arizona)
W74-03921

THE ESTIMATION OF NET RADIATION AND POTENTIAL EVAPOTRANSPIRATION USING ATMOMETER MEASUREMENTS,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
A. C. Dilley, and I. Helmond.
Agricultural Meteorology, Vol 12, p 1-11, 1973. 2 fig, 1 tab, 18 ref.

Descriptors: *Evapotranspiration, *Atmometers, *Radiation, *Solar radiation, *Arid lands, *Irrigation, Measurement, Evaporation pans, Transpiration, Lysimeters, Correlation analysis, Irrigation effects.

The estimation of evapotranspiration is necessary to evaluate the irrigation requirements of a crop in arid regions. The various evaporation rates of freely transpiring crops and of two differentially shaded atmometers sited above the crop are evaluated with respect to a combination-type formula. Relationships between the atmometer evaporation rates and the two terms of the formula describing crop evaporation are examined and established experimentally for a pasture surface. A high correlation was found between measured and estimated values of net radiation and crop potential evapotranspiration. (Muller-Arizona)
W74-04129

EFFECT OF IRRIGATION FREQUENCY ON THE AVERAGE EVAPOTRANSPIRATION FOR VARIOUS CROP-CLIMATE-SOIL SYSTEMS,
Universidad Catolica de Chile, Santiago. Departamento de Edafologia.
For primary bibliographic entry see Field 3F.
W74-04140

SOME CAUSES OF FAILURE IN THE CLOSENESS OF CORRELATIVE CONNECTION BETWEEN TREE SPECIES TRANSPIRATION AND METEOROLOGICAL FACTORS, (IN RUSSIAN),
Ts. M. Khashes, and V. I. Bobro.
Ekologiya. Vol 3, No 2, p 102-104. 1972.
Identifiers: Berlin poplar, *Meteorological condition, Oak, Poplar, Temperature, *Transpiration(Trees), White willow, White acacia, *Correlation coefficiant, *Tree species.

During the investigation of relation between transpiration and meteorological factors in a variety of trees, it was established that such a relation is much stronger during the first half of the day. The correlation coefficient between transpiration and air temperature was between 0.8-0.62, which shows a direct dependence of these 2 factors. The temperature during these experiments was not lower than 12C and not higher than 33-34C. Results of trees such as white willow, Berlin poplar, white acacia and oak are presented.--Copyright 1973, Biological Abstracts, Inc.
W74-04283

2E. Streamflow and Runoff

RIVER RESPONSE,
Colorado State Univ., Fort Collins.
J. Santos-Cayade, and D. B. Simons.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 1, p 1-1--1-25, 1973. 14 fig, 19 ref.

Descriptors: *Channel morphology, *Sedimentation, *Channel erosion, Bed load, Suspended load, Regime, Sediment transport, Discharge(Water), Alluvial channels, Profiles, Graded, Equilibrium, Rivers.

Fluvial systems adjust continuously to the effects of the erosion cycle. When a river system is looked upon from the engineering time frame of reference, the cause and effect relations vary with respect to geologic time. Of special interest are the independent variables (water and sediment discharge) and the dependent variable (channel morphology). Most streams flow in channels that may vary locally with space and time, but over an extended reach the streams display somewhat constant dimensional characteristics. The delicate equilibrium established between water-sediment discharge and slope-channel geometry is altered when trends or changes are introduced in the water and/or sediment discharge time series of a graded stream. Then the river system adjusts toward a new channel geometry and slope that will be in dynamic equilibrium with the modified water and sediment time series. If the modified time series reaches a stationary state so will the slope and channel characteristics. However, the river system response is manifested with a time lag in reference to permanent changes in the water and sediment time series. Relationships were derived to provide an initial step toward the analysis of river system response to water resources development that affect the water and sediment discharge characteristics of the river system. Applications of the relationships are prediction of possible future changes of river stage and form resulting from significant variations in water and sediment discharge characteristics of the river. (Knapp-USGS)
W74-03785

FLOW OVER ALLUVIAL BED,
Colorado State Univ., Fort Collins. Engineering Research Center.
H. W. Shen.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 2, p 2-1--2-31, 1973. 16 fig, 1 tab, 44 ref.

Descriptors: *Alluvial channels, *Roughness(Hydraulic), *Channel morphology, *Flow, Channel flow, Open channel flow, Flow friction, Streamflow, Regime, Erosion, Sedimentation.

When fluid flows over a movable bed, the bed surface is normally deformed into various configurations. Some of the available methods of estimating as well as predicting these resistances, some of the difficulties in analyzing alluvial bed form resistance, and a few recent studies on the statistical properties of bed forms are discussed. The alluvial bed resistance problem is by no means solved. The problem is not only due to the difficulty of predicting form roughness but also the difficulty of using the correct skin roughness. The investigation on the statistical properties of alluvial bed profiles offers promise. It is especially attractive for the investigation on the similarities and differences between laboratory bed forms where flow depths are limited and river bed forms where bed forms are not normally limited by flow depth and width. (Knapp-USGS)
W74-03786

FLOW RESISTANCE OVER SHORT SIMULATED VEGETATION AND VARIOUS TALL SIMULATED VEGETATION GROUPINGS ON FLOW RESISTANCE AND SEDIMENT YIELD,
Colorado State Univ., Fort Collins. Engineering Research Center.
H. W. Shen.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 3, p 3-1--3-51, 1973. 25 fig, 4 tab, 47 ref.

Descriptors: *Flow resistance, *Vegetation effects, *Sediment yield, *Fluid friction, *Roughness(Hydraulic), Equations, Shear drag, Hydraulics, Open channel flow, Retardance.

Flow resistance over short vegetation and the effect of reducing sediment yield by retarding flow rates due to flow through tall vegetation on the order of flow depth are discussed. The retardation of flow rate due to tall vegetations, whose heights are of the same order of magnitude as flow depth, can be estimated if the spacing between the vegetation is at least 6 diameters in the downstream direction and 3 diameters in the transverse direction. Tall vegetation grouped into staggered patterns is much more effective in reducing flow rate than any other pattern. The average boundary shear stress on the bed is much more sensitive to its change of plot bottom slope and the size of vegetation than the variation of flow discharge and sediment size. The retardation of boundary shear stress on the bed will increase significantly as trees grow larger. (Knapp-USGS)
W74-03787

THE RHEIN STUDY,
California Univ., Berkeley.
For primary bibliographic entry see Field 2J.
W74-03788

REGIME PROBLEMS OF RIVERS FORMED IN SEDIMENT,
Alberta Univ., Edmonton.
For primary bibliographic entry see Field 2J.
W74-03789

NATURAL MIXING PROCESSES IN RIVERS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 5B.
W74-03790

EVALUATION OF THERMAL POLLUTION CONTROL ALTERNATIVES,
National Environmental Research Center, Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W74-03791

MECHANICS OF HEAT TRANSFER IN NON-STRATIFIED OPEN-CHANNEL FLOWS,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 5B.
W74-03792

SOME EFFECTS OF WASTES ON NATURAL WATERS,
Vanderbilt Univ., Nashville, Tenn.
For primary bibliographic entry see Field 5B.
W74-03793

HEATED SURFACE DISCHARGES INTO FLOWING AMBIENT STREAMS AND LAKES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 5D.
W74-03794

FISH BEHAVIOR RELATED TO THERMAL POLLUTION,
Colorado State Univ., Fort Collins. Dept. of Fishery and Wildlife Biology.
For primary bibliographic entry see Field 5C.
W74-03795

AGRICULTURAL IMPACT ON WATER QUALITY IN WESTERN RIVERS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-03796

DISPERSION OF CONTAMINANTS ATTACHED TO SEDIMENT BED LOAD,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-03797

BEHAVIOR OF COHESIVE MATERIAL FROM A SOIL ENGINEER'S VIEWPOINT,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W74-03798

UPSLOPE EROSION ANALYSIS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2J.
W74-03799

APPLICATION OF REMOTE SENSING TO RIVER MECHANICS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. F. Ruff.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 16, p 16-1--16-22, 1973. 14 fig.

Descriptors: *Remote sensing, Rivers, *River systems, *Data collections, *Aerial photography, Water temperature, Mapping, Channel morphology, Infrared radiation, Water pollution.

Applications of multiband photography, precision mapping camera photography, and thermal infrared imagery obtained with a line scanner for evaluating certain characteristics related to river mechanics are summarized. These three remote sensing systems provide a record of the intensity of electromagnetic energy being reflected or emitted from a terrestrial scene. There is a variety of film-filter combinations available for photographic work over the wavelengths from approximately 0.3 micrometer to 0.9 micrometer; optical-mechanical line scanners with appropriate detectors can be used for obtaining imagery in a variety of wavelength bands. The data can provide a quasi-synoptic survey of flow phenomena over relatively large areas. The thermal infrared wavelengths are of value for mapping the radiometric temperature patterns at the surface. (Knapp-USGS)
W74-03800

SUSPENDED-SEDIMENT SAMPLING VARIABILITY,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W74-03801

FLOOD PROFILES IN THE UMPQUA RIVER BASIN, OREGON, PART 2,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 4A.
W74-03803

FLOODS IN IOWA: TECHNICAL MANUAL FOR ESTIMATING THEIR MAGNITUDE AND FREQUENCY,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 4A.
W74-03805

FLOODS OF THE 1970 AND 1971 WATER YEARS IN MISSISSIPPI,
Geological Survey, Jackson, Miss.
C. H. Tate.
Mississippi Board of Water Commissioners Bulletin 73-2, October 1973. 20 p, 5 fig, 2 tab, 3 ref, append.

Descriptors: *Floods, *Flood profiles, *Peak discharge, *Mississippi, Flood data, Flood frequency, Flood peak, Rainfall, Hydrologic data, Gaging stations, Streamflow, Flow rates.

Floods in Mississippi during the 1970 and 1971 water years were of limited areal extent. Peak discharges exceeding those of 50-year recurrence intervals were observed at some sites during five events in the 2-year period. The emphasis of this report is on the peak stages and discharges of streams. The rainfall data give a generalization of its amounts and variability. This is one of a series of reports on flood events in Mississippi. (Woodard-USGS)
W74-03816

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR ELM FORK TRINITY RIVER, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
E. D. Lucero.
Open-file report, December 1973. 27 p, 2 fig, 2 tab.

Descriptors: *Streamflow, *Hydrologic data, *Runoff, *Texas, Data collections, Rainfall, Rain gages, Flow rates, Gaging stations, Flood protection, Flood control, Watershed management.
Identifiers: *Trinity River basin(Tex).

This report, the 12th and last in a series of annual basic-data reports for the Elm Fork Trinity River, Texas, study area, contains the rainfall, runoff, and storage data collected during the 1971 water year for the 46.0-square-mile area above the stream-gaging station Elm Fork Trinity River near Muenster. The locations of floodwater-retarding structures and hydrologic-instrument installations in the area are shown. The 14 floodwater-retarding structures provide capacity for flood-detention storage of 10,500 acre-feet of flood runoff from 33.5 square miles of the 46.0-square-mile drainage area. A summary of the physical data of each of the 14 floodwater-retarding structures is tabulated. The yearly average rainfall from rain gages in the area for the 1971 water year was 23.30 inches, or 70% of the 15-year (1957-71) average. Yearly mean discharge at the stream-gaging station was 4.79 cfs, compared with the 15-year (1957-71) average of 19.0 cfs. Total runoff during the year was 3,470 acre-feet, 1.41 inches, which is 6% of the total rainfall. (Woodard-USGS)
W74-03818

QUASI 2-YEAR VARIATION IN RUNOFF OF USSR RIVERS (KVAZIDVUKHLETNYAYA VARIATSIYA V STOKE REK SSSR),
O. F. Kondratsova, and N. P. Smirnov.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 105, No 2, p 149-160, March-April 1973. 7 fig, 3 tab, 28 ref.

Descriptors: *Runoff, *Rivers, *Variability, *Atmosphere, *Air circulation, Winds, Cycles, Discharge(Water).
Identifiers: *USSR, Stratosphere, Spectrograms.

Increased emphasis is placed on the study of a 2-year variation in long-term fluctuations of river runoff in connection with discovery of a 2-year wind oscillation in the stratosphere. Average monthly water discharges at 35 gaging stations on 16 rivers in European Russia, 6 rivers in Soviet Central Asia, and 13 rivers in Siberia were subjected to spectral and periodogram analysis. Except for several rivers in East Siberia, a variation having a period of about 25-30 months is observed in runoff fluctuations of USSR rivers in 1931-62. This variation is most clearly expressed on rivers in European Russia and Soviet Central Asia and is poorly expressed on rivers in northern regions of East Siberia. The contribution of this variation to total variability of runoff during the period under investigation is, on the average, 20%-25%. General patterns in the manifestation of a quasi 2-year cycle in runoff of USSR rivers are determined by changes in the pressure field depending on the stratospheric cycle. Increased runoff for almost all European Russia and northern regions of East Siberia and diminished runoff for extreme southeastern European Russia, Soviet Central Asia, and southern regions of West and East Siberia correspond to periods of easterly currents in the equatorial stratosphere. The opposite picture in runoff distribution for the USSR is observed during periods of westerly currents in the equatorial region. (Josefson-USGS)
W74-03834

DATA OF GLACIOLOGICAL STUDIES. CHRONICLE AND DISCUSSIONS (MATERIALY GLYATSIOLOGICHESKIKH ISSLEDOVANIY. KHRONIKA, OBSUZHDENIYA).
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-03835

A MAP OF ANNUAL RIVER RUNOFF IN THE PAMIRS AND PAMIR-ALAY MOUNTAINS (KARTA GODOVOGO STOKA REK PAMIRA I PAMIRO-ALAYA),
A. O. Kemmerikh.
In: Materialy glyatsiologicheskikh issledovaniy, Khronika, Obsuzhdeniya, No 19, p 53-59, Moscow, January 1972. 3 fig, 1 tab, 5 ref.

Descriptors: *Maps, *Average runoff, *Annual, *Rivers, *Mountains, Slopes, Elevation, Alpine, Glaciers, Watersheds(Basins), River basins, Discharge(Water), Variability, Investigations.
Identifiers: *USSR(Pamirs-Alay Mountains).

The Pamir and Pamir-Alay mountain ranges are among the highest in the USSR. Many peaks rise to 5,000-6,000 m, and individual peaks exceed 7,000 m above sea level. A map of average annual runoff of rivers in this region was based on hydrologic investigations conducted in 1962-69 and on analysis of natural conditions and known runoff data. Relations between average annual discharge and average basin elevation were based on data of 135 hydrologic stations with periods of record ranging from more than 25 years to less than 5 years. Runoff increases with basin elevation to 4,500-4,700 m and decreases from peripheral western, southwestern, and southern ridges inland in an easterly and northeasterly direction. The largest area of maximum runoff (4,225 sq km) with specific discharges of 40-50 liters/sec/sq km is located in the Koksu, Yarkhych, Sorbog, Sokh, and Zarafshan River basins. Total annual runoff from the basin area of the Pamir and Pamir-Alay ranges if 65.11 cu km, which corresponds to an average specific discharge of 12.2 liters/sec/sq km. Runoff of rivers from northern slopes of the Alay and Turkestan ridges (covering 22,088 sq km) into the Syr-Dar'ya River is 6.75 cu km (10.5%) at an average specific discharge of 9.1 liters/sec/sq km. Runoff of rivers in the Amu-Dar'ya basin, covering 138,657 sq km, is 56.58 cu km (86.9%) at an average specific discharge of 13 liters/sec/sq km. Variability of annual runoff on rivers in the Pamir and Pamir-Alay ranges is comparatively small. Coefficients of variation of annual runoff are, on the average, 0.10 to 0.20, and only for rivers in low mountain regions of the Pamir-Alay range do they reach 0.25-0.35. The coefficient of variation decreases with increasing basin glaciation. (See also W74-03835) (Josefson-USGS)
W74-03836

CONTRIBUTIONS TO THE THEORY OF SURFACE WAVES ON A VISCOUS FLUID,
Wisconsin Univ., Madison. Dept. of Mathematics.
S-M. Shih.
Available from the National Technical Information Service as PB-227 457; $10.50 in paper copy, $1.45 in microfiche. Ph.D. thesis, 1973. 135 p, 25 ref. OWRR A-037-WIS(8). 14-31-0001-3250.

Descriptors: *Waves(Water), *Flow, *Approximation method, *Free surfaces, *Mathematical models, Model studies, Fluid mechanics, Open channel flow.
Identifiers: *Asymptotic theory, *Helical waves.

Surface waves in a viscous incompressible fluid with surface tension in an open channel of arbitrary cross section were studied. Both linearized and nonlinear problems are considered. An abstract approach based upon the theory of Hilbert spaces is adopted to investigate the linearized problem, and a perturbation method is used to study the nonlinear problem. The unique solvability of the linearized Navier-Stokes equations is proved by using the Galerkin's method. Centering around the concept of a critical speed of the surface wave, a singular perturbation scheme within the framework of long wave approximation is developed to study the asymptotic behavior of nonlinear surface waves in the channel. A critical Reynolds number is then obtained from this scheme as a criterion for the stability of the wave motion. By the use of various L2-estimates, a rigorous justification of the singular perturbation is made for the linearized problem in which the channel surface is an inclined plane.
W74-03901

PHYSICAL EFFECTS OF MAINTAINING DRAINAGE CHANNELS IN NORTH CAROLINA'S COASTAL AREA,
Soil Conservation Service, Raleigh, N.C.

W. R. Swicegood, and G. J. Kriz.
Journal of Soil and Water Conservation, Vol 28, No 6, p 266-269, November-December 1973. 5 fig, 1 tab.

Descriptors: *Open channel flow, *Vegetation effects, *North Carolina, *Channel improvement, Drainage systems, Open channels, Silting, Dredging.
Identifiers: *Drainage channels.

Typical eastern North Carolina channels show a general trend toward capacity loss at a rate that would require complete channel modification every 10 to 15 years. The loss appears to be caused principally by uncontrolled vegetation, which emphasizes the importance of mowing the bottom and lower sections of channels. (Knapp-USGS)
W74-04075

ON WIND TIDES AND LONGSHORE CURRENTS OVER THE CONTINENTAL SHELF DUE TO WINDS BLOWING AT AN ANGLE TO THE COAST,
National Engineering Science Co., Pasadena, Calif.
C. L. Bretschneider.
Available from NTIS as AD-645 703, for $6.00 paper copy, $1.45 microfiche. Report No. SN-134-13, December 1966. 58 p, 16 fig, 2 tab, 7 ref. Nonr-4177(00).

Descriptors: *Wind tides, *Coriolis force, *Continental shelf, Coasts, Mannings equation.
Identifiers: *Longshore currents.

The problem of wind tide caused by winds blowing at an angle to the coast is discussed. The major component of wind tide is that due to the wind stress directed perpendicular to the coast. The second component is that due to wind stress parallel to the coast and in effect is associated with the coriolis force or the rotation of the earth. Equations of hydrodynamical motion in two dimensions are presented. Certain assumptions are then made which lead to a direct analytical solution. One of the assumptions made is that the net transport shoreward is insignificant compared with the longshore transport, and in effect the net transport shoreward becomes zero under steady state conditions. Other assumptions made are that the rate of precipitation impact is negligible, the water surface slope parallel to the coastline is negligible, and that the higher order differentials along the coastline are much smaller than the corresponding counterparts directed perpendicular to the coastline. Finally, it is assumed that the bottom friction factor to be used with the longshore current can be approximated by use of n in Manning's equation. The special case of a continental shelf, bottom of constant slope, is treated in detail, although it is shown that the same principles can be applied to a composite bottom profile, representing a bottom of variable slope. (Sinha-OEIS)
W74-04210

THE EFFECTS OF WIND AND PRECIPITATION ON THE MODIFICATION OF SOUTH BEACH, CRESCENT CITY, CALIFORNIA INCLUDING AN APPENDIX ON THE FOCUSING OF TSUNAMI ENERGY AT CRESCENT CITY,
Atmospheric Research Group, Altadena, Calif.
J. A. Roberts, and E. K. Kauper.
Available from NTIS as AD-607 944 for $6.00 paper copy, $1.45 microfiche. Final Report prepared for Army Environmental Sciences Division, October 1964. 32 p, 20 fig, 2 tab, 69 ref, 4 append. DA-49-092-ARO-38.

Descriptors: *Tsunamis, *Beaches, *Winds, Precipitation(Atmospheric), *California, Geomorphology, *Refraction(Water waves).
Identifiers: Crescent City(CA), *Wind waves, Swell, Submarine topography, Seamounts.

A study to assess and to observe the effects of the subaerial processes on a beach modified catastrophically by a geomorphologic agent uses a beach in the Crescent City, Calif. area as a base. After the preliminary field work, it was determined that the beach had indeed been modified but not, as originally thought, by the tsunamis of March 27-28, 1964. Following a brief climatic summary, information is given on beach configuration, instrumentation and data reduction techniques. Finally, possible mechanisms of beach modification are discussed. These refer to direct and indirect wind effects, precipitation, hydrology, wind waves and swell. Refraction diagrams, prepared by numerical-graphic means, indicate the possible focusing effects of two seamounts, northwest of the harbor. The tsunami traveling from the Prince William Sound Region of Alaska would be refracted with the apparent result that the wave front would be focused on the Crescent City area. It also appears that the segments of the refracted wave front may have arrived at Crescent City in phase. The result would have been wave heights of substantially greater magnitude than those of a single segment of the wave. (Sinha-OEIS)
W74-04212

TIME DEPENDENT SHEAR STRESS BENEATH A SHOALING WAVE,
Naval Academy, Annapolis, Md.
For primary bibliographic entry see Field 2J.
W74-04213

THEORETICAL STUDY OF LONGSHORE CURRENTS ON A PLANE BEACH,
Massachusetts Inst. of Tech., Cambridge. Hydrodynamics Lab.
P. S. Eagleson.
Available from NTIS as AD-664 795 for $6.00 paper copy, $1.45 microfiche. Report No 82, prepared for Army Coastal Engineering Research Center, December 1965. 54 p, 7 fig, 10 ref, 1 append. DA-49-055-CIV-ENG-62-9.

Descriptors: *Surf, *Beaches, *Currents(Water), Equations, Model studies.
Identifiers: *Longshore currents, Momentum flux.

Momentum flux considerations are used to formulate a differential equation governing the growth, with distance, of the mean longshore current velocity in the surf-zone on a plane, impermeable beach due to monochromatic waves. The equation is solved for the flow situation down-stream of a surf-zone barrier. Experiments are performed which verify this solution at least at laboratory scale. The asymptotic (uniform flow) form of the relation is also shown to be in good agreement with the field and laboratory data of other investigators. Conclusions are reached governing the size of laboratory models necessary to represent conditions of fully developed longshore currents. (Sinha-OEIS)
W74-04214

WAVE SHOALING,
National Engineering Science Co., Pasadena, Calif.
B. J. LeMehaute, and L. M. Webb.
Available from NTIS as AD-608 744, for $6.00 paper copy, $1.45 microfiche. NESCO Report SN 134-2, April 1964. 94 p, 15 fig, 10 ref. Nonr-4177(00).

Descriptors: *Waves(Water), *Shallow water, *Gravity waves, Slopes, Energy.
Identifiers: *Shoaling(Waves), Periodic waves, Bottom topography, *Energy flux.

The concepts of energy flux and group velocity for nonlinear periodic gravity waves are discussed. The average energy flux, average energy per wavelength and 'group velocity' are calculated for irrotational periodic gravity waves at a third order of approximation. Then the principle of conservation of transmitted energy between wave orthogonals is applied to the same order of approximation for determining the variation of wave height in decreasing depth. The results are presented as nomographs. The 'shoaling coefficient' needs to be expressed at least at a third order of approximation to account for experimental results. A summary is included of a literature survey which has been carried out on the problem of littoral processes. (See also W74-04216 and W74-04217) (Sinha-OEIS)
W74-04215

WAVE SHOALING,
National Engineering Science Co., Pasadena, Calif.
R. C. Y. Koh, and B. J. LeMehaute.
Available from NTIS as AD-632 849, for $6.00 paper copy, $1.45 microfiche. NESCO Report SN-134-9, January 1966. 83 p, 7 fig, 10 ref, 4 append. Nonr-4177(00).

Descriptors: *Waves(Water), *Shallow water, *Continental shelf.
Identifiers: *Shoaling(Waves), *Surf zone, Periodic waves, *Wave spectra, Conservation of energy.

This study is a contribution to a larger project for studying the modification of wave spectra on the continental shelf and in the surf zone. Prior to dealing with a wave spectrum, a study of nonlinear effects on periodic waves appears to be necessary. For this purpose it is assumed that both friction effects and reflection effects are small. Then the principle of conservation of energy flux is applied to a periodic wave. The calculation is performed up to the fifth order and the corresponding result is compared with the third and first order of approximation. (See also W74-04215 and W74-04217) (Sinha-OEIS)
W74-04216

LAMINAR AND AXISYMMETRIC VERTICAL JETS IN A STABLY STRATIFIED ENVIRONMENT,
Esso Research and Engineering Co., Florham Park, N.J.
For primary bibliographic entry see Field 8B.
W74-04224

AN IMPROVED MIXING LENGTH THEORY OF TURBULENT HEAT AND MASS TRANSFER,
Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 8B.
W74-04231

THERMAL INTERACTION OF TWO STREAMS IN BOUNDARY-LAYER FLOW SEPARATED BY A PLATE,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
For primary bibliographic entry see Field 8B.
W74-04236

TRANSIENT HEAT AND MASS TRANSFER IN FULLY DEVELOPED LAMINAR TUBE FLOWS,
Saskatchewan Univ., Saskatoon. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 8B.
W74-04237

SELF-SIMILAR SOLUTIONS FOR A THREE-COMPONENT AXISYMMETRICAL FLOW OF A VISCOUS FLUID,
For primary bibliographic entry see Field 8B.
W74-04248

THE STRUCTURAL-CONTINUUM THEORY OF DILUTE SUSPENSIONS OF RIGID ELLIPSOIDAL PARTICLES,
Kiev State Univ. (USSR).
For primary bibliographic entry see Field 8B.
W74-04249

'INTERNAL WAVES' ADVANCING ALONG SUBMARINE CANYONS,
Scripps Institute of Oceanography, La Jolla, Calif. Geological Research Div.
F. P. Shepard, N. F. Marshall, and P. A. McLoughlin.
Science, Vol 183, No 4121, p 195-198, January 18, 1974. 3 fig, 6 ref. NSF Contract GA-19492, ONR Contract Nonr-2216(23).

Descriptors: *Submarine canyons, *Internal waves, *Currents(Water), Density stratification, Turbidity currents, Density currents, *California.

Patterns of alternating up- and downcanyon currents were traced along the axes of submarine canyons off California. The patterns arrive later at stations nearer the heads of coastal canyons. Where a canyon heads between two islands, the patterns advance down the axis. The propagation speeds of these patterns were estimated at 25 to 88 cm per second. Internal waves are the probable explanation. (Knapp-USGS)
W74-04261

2F. Groundwater

WATER RESOURCES OF THE NEW JERSEY PART OF THE RAMAPO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-03806

APPRAISAL OF GROUND-WATER AVAILABILITY AND MANAGEMENT PROJECTIONS, WALLA WALLA RIVER BASIN, WASHINGTON AND OREGON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4B.
W74-03812

THE EFFECT OF FLUX AND GRAVITATIONAL FORCES ON MISCIBLE DISPLACEMENT IN A THIN HOMOGENEOUS BED,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
W. J. Esmail.
Available from the National Technical Information Service as PB-227 711; $9.00 in paper copy, $1.45 in microfiche. OWRR A-027-LA(1).

Descriptors: *Underground waste disposal, *Groundwater recharge, Water storage, *Injection wells, Recharge wells, Hydraulics, Artificial recharge, Saline aquifers, *Miscible displacement, *Mathematical models, *Gravitational water, Percolation, *Groundwater movement, *Secondary recovery(Oil), Water reuse.
Identifiers: Water flux, Dripping systems.

The study experimentally investigates gravitational effects in a dipping semi-bounded miniaquifer and also incorporates the effect of pre-existing ground-water movement (flux) in both horizontal and dipping systems. In all cases studied, the direction of the flux was parallel to the closed boundary of the system. In the horizontal system, flux always reduced recovery efficiency. Use of a closed boundary had little effect on recovery efficiencies presently reported as long as the boundary was not closely approached by the injected fluid. A mathematical model was developed for a three-dimensional system to predict the recovery efficiency for horizontal and dipping systems with or without flux. Recovery efficiencies predicted by the model were compared to those obtained in 21 experimental runs. Good agreement was observed in all horizontal runs and in dipping systems in which no flux was present. Less agreement was shown in dipping systems in which flux was present. In such systems the agreement was good when flux rates were moderate, and poor when flux rates were high. Results of this study are applicable to miscible displacement operations where a density difference exists between the native and the injected fluids in horizontal and dipping systems. Subsurface waste disposal and the secondary recovery operations in the petroleum industry are examples of such applications.
W74-03896

HYDROGEOLOGY OF THE PRINCIPAL AQUIFERS IN SULLIVAN AND GREENE COUNTIES, INDIANA,
Geological Survey, Indianapolis, Ind.
L. W. Cable, and T. M. Robison.
Indiana Department of Natural Resources Division of Water Bulletin No 35, 1973. 26 p, 8 fig, 3 plate, 4 tab, 28 ref.

Descriptors: *Hydrogeology, *Groundwater resources, *Water quality, *Indiana, *Aquifer characteristics, Water wells, Water yield, Water level fluctuations, *Water analysis, Chemical analysis, Groundwater movement, Precipitation(Atmospheric).
Identifiers: Sullivan County(Ind), Greene County(Ind).

The rocks that underlie Sullivan and Greene Counties, Indiana, may be placed in two general categories--consolidated and unconsolidated. Based on their water-bearing properties the consolidated rocks are subdivided into three major hydrologic units. Aquifers in unit 1 are relatively thickbedded limestone and sandstone bodies. The average yield from wells in this unit is 10 gpm with yields of as much as 100 gpm reported. The aquifers of unit 2 are sandstone bodies which occur throughout the strata of this unit. The average yield of wells in this unit is 5 gpm, and maximum yields are about 20 gpm. Unit 3 is similar in most respects to unit 2; however, in this unit there are fewer water-bearing sandstone bodies and, as a consequence, numerous dry holes are drilled. Aquifers in the unconsolidated rocks of the area are coarse sand and gravel deposits located predominantly along the stream valleys. The valleys of the Wabash and White Rivers contain the thickest and, therefore, the best unconsolidated rock aquifers. Yields from wells in these aquifers average 350 gpm with yields of as much as 1,000 gpm reported. Analyses of over 300 water samples indicate that the consolidated rocks of the area yield calcium bicarbonate, sodium bicarbonate, and sodium chloride water, and the unconsolidated rocks yield calcium bicarbonate water. (Woodard-USGS)
W74-04049

PHREATIC VS. VADOSE DIAGENESIS: STRATIGRAPHY AND MINERALOGY OF A CORED BOREHOLE ON BARBADOS, W. I.,
Brown Univ., Providence, R.I. Dept. of Geological Sciences.
R. P. Steinen, and R. K. Matthews.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1012-1020, December 1973. 2 fig, 1 tab, 38 ref. NSF Grant GA-26102.

Descriptors: *Diagenesis, *Karst hydrology, *Limestones, *Mineralogy, Water circulation, Groundwater movement, Aqueous solutions, Karst, Water chemistry, *Stratigraphy.
Identifiers: *Barbados(W.I.).

Diagenesis involving meteoric water may take place in the vadose-subaerial environment or in the freshwater phreatic environment. Meteoric water diagenesis occurs more rapidly in the phreatic diagenetic environment. Continuous drill core was recovered from a borehole in the reef tract on the south coast of Barbados, W.I. Carbonate sediments from the upper 1.5 m of the borehole have been in the vadose diagenetic zone since initial emergence from the depositional environment. These carbonate sediments are for the most part mineralogically unstable; they have not been affected by extensive dissolution. Freshwater phreatic lenses associated with high stands of sea level have occupied the pore systems of the sediments between 1.5 m and 15.3 m depth at least twice and possibly three times. Those zones occupied at least once by a fresh phreatic lens show complete mineral stabilization of the inter-coral matrix to low-Mg calcite, and extensive cementation and dissolution. Sediment from the lowest part of the core still retains most of its depositional mineralogy and shows only minor dissolution or cementation. This portion of the borehole has alternately been subjected to the vadose zone (during glacial low stands of the sea) and the marine phreatic zone (during interglacial high stands). Although the sediment from this borehole spent more time in the vadose diagenetic environment than all other environments combined, it is significant that only those portions of the borehole section once occupied by fresh phreatic pore fluids show extensive diagenetic modification. (Knapp-USGS)
W74-04068

EFFECT OF ADJACENT EXPANSIBLE FLUIDS AND CAPROCK LEAKAGE ON BUILDUP AND DRAWDOWN BEHAVIOR OF WELLS IN AN AQUIFER,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 4B.
W74-04152

EFFECTS OF PUMPING FROM THE OHIO RIVER VALLEY ALLUVIUM BETWEEN CARROLLTON AND GHENT, KENTUCKY,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 4B.
W74-04155

NUCLEAR SPIN-LATTICE RELAXATION OF LIQUIDS CONFINED IN POROUS SOLIDS,
Massachusetts Inst. of Tech., Cambridge.
S. D. Senturia, and J. D. Robinson.
Society of Petroleum Engineers Journal, Vol 10, No 3, p 237-244, September, 1970. 1 tab, 9 ref.

Descriptors: *Porous solids, *Nuclear Magnetic Resonance, Water properties, *Pores, Mathematical models, Porosity, Diffusion, Wettability, Probability, *Measurement.
Identifiers: Relaxation time, Larmor precession frequency, Paramagnetic sites.

Previous investigators have observed that the spin-lattice relaxation time of water confined in a porous solid is shorter than in a large sample of water. Measurements were made of the proton relaxation time of bulk water and water contained in the pores of Selas porcelain cylinders having average pore radii of 2.2, 0.7 and 0.42 microns. Results of these measurements were used to guide the theoretical development. For the system water-Selas porcelain and for a single pore size in the range of petrophysical interest, the form of the spin-lattice relaxation was a simple exponential with the decay constant being a sum of two terms. The first term is the reciprocal of the relaxation time in the bulk liquid, while the second term represents the rate at which molecules diffuse to the pore surfaces and subsequently undergo surface relaxation. A random-walk, diffusion model was developed to account for the experimental observations. (Gray-NWWA)
W74-04157

EVALUATION OF GROUNDWATER RESOURCES IN LIVERMORE VALLEY, CALIFORNIA,
California Univ., Berkeley. Dept. of Civil Engineering.
P. A. Witherspoon.
Completion Report, UCAL-WRC-W-189, January 1971, 6 p, 5 ref. OWRR B-066-CAL(2).

Descriptors: *Groundwater movement, *California, Mathematical models, *Finite element analysis, Aquifer characteristics, *Sediments, *Alluvial aquifers, *Markov processes, Lithologic logs, Wells, Permeability.
Identifiers: Livermore valley(Calif).

It was planned to use mathematical models in an effort to determine: (a) subsurface rates and directions of flow in the component parts of the basin, (b) effectiveness of existing hydrologic barriers, and (c) effect on subsurface flow patterns of current and future rates of recharge and discharge. A new numerical technique was developed that utilizes the finite element method in solving fluid flow problems in complex shaped aquifer systems with heterogeneous and anisotropic properties. Layers and lenses of these two types of sediments where distributed arbitrarily throughout two-dimensional cross-sections, and the hydrologic characteristics of the whole were studied using finite element methods. Emphasis was placed on trying to model the actual distribution of layers and lenses within the Livermore groundwater basin. In a few locations within the Livermore Valley, electric logs were available that provided good lithologic control in the upper 300 feet of sediments. By analyzing the lithologic types at fixed vertical intervals, it was possible to obtain one-step Markov transitions matrices for the 100 ft - 300 ft depth interval in eighteen wells. The matrices were than used to predict the vertical sequence of permeable and relatively impermeable sediments at each well location; it appears that a satisfactory method has been developed for predicting the vertical variation of alluvial sedimentation.
W74-04201

CHANGES IN STATISTICAL PROCESSING OF GROUNDWATER LEVEL MEASUREMENTS (WANDLUNGEN BEI DER STATISTISCHEN AUFBEREITUNG VON GRUNDWASSERSTANDSMESSWERTEN),
P. Sassenberg.
Deutsche Gewaesserkundliche Mitteilungen, Vol 17, No 5, p 130-134, October 1973. 11 ref.

Descriptors: *Groundwater, *Water table, *Water levels, *Statistics, *Data processing, Electronic equipment, Measurement.
Identifiers: *Germany.

Groundwater level measurements expressing the distance between measuring point and water table were used in statistical processing prior to necessary changeover to meters above mean sea level. Expansion of hydrological measuring networks and the need for faster, more reliable and comprehensive statistical processing of groundwater level measurements led to the use of data processing equipment. Limitations that had to be accepted as long as manual procedure and the punched card system were in use are described, and possibilities which data processing holds for statistical processing of groundwater level measurements are considered. (Josefson-USGS)
W74-04247

THE ROLE OF MOORS IN GROUNDWATER RECHARGE (DIE ROLLE DER MOORE BEI DER GRUNDWASSERNEUBILDUNG),
Ausseninstitut fuer Moorforschung und Angewandte Bodenkunde, Bremen (West Germany).
R. Eggelsmann.
Deutsche Gewaesserkundliche Mitteilungen, Vol 17, No 5, p 134-137, October 1973. 3 fig, 5 tab, 24 ref.

Descriptors: *Groundwater recharge, *Groundwater movement, *Bogs, *Peat, *Water balance, Evaporation, Runoff, Precipitation(Atmospheric), Permeability, Vegetation.
Identifiers: *Germany, *Moors.

Information on groundwater recharge beneath different types of moors in northwestern Germany is deduced from water-balance data and from measured permeability of local peat. Groundwater discharge beneath swampy spruce stands is greater than beneath low moor, and groundwater discharge beneath low moor is greater than beneath high moor. Determined as equal to or less than 2 liters/sec/sq km, groundwater discharge is considerably lower than that of sand or gravel. (Josefson-USGS)
W74-04251

A NUMERICAL MODEL OF MULTIPHASE FLOW AROUND A WELL,
Institut Francais du Petrole, des Carburants et Lubrifiants, Rueil-Malmaison (France).
For primary bibliographic entry see Field 4B.
W74-04258

EFFECTS OF THE FEEDER CANAL ON THE WATER RESOURCES OF THE FORT LAUDERDALE PROSPECT WELL-FIELD AREA,
Geological Survey, Miami, Fla.
For primary bibliographic entry see Field 5G.
W74-04259

VARIATION OF GROUNDWATER LEVELS AND A CALCULATION OF THE EFFECTIVE FISSURE POROSITY AT THE FILE HAJDAR, GOTLAND,
Geological Survey of Sweden, Stockholm.
T. Fagerlind, and L. Nordberg.
Geologiska Foreningens Forhandlingar, Vol 95, No 554, Part 3, p 317-327, September 30, 1973. 11 fig, 4 tab, 11 ref.

Descriptors: *Groundwater, *Water level fluctuations, *Porosity, *Recharge, *Evapotranspiration, Water levels, Aquifer characteristics, Hydrogeology.
Identifiers: *Sweden(Gotland).

At File Hajdar on the island of Gotland, Sweden, Silurian limestones constitutes the main aquifer. Very large and rapid short-term fluctuations of the groundwater level have been recorded (25 m in less than a day). The annual amplitude is, in general, less than 30 m. The fluctuations, caused by precipitation and evapotranspiration, were used to calculate porosity. The effective fissure porosity of the limestone ranges from 0.06% to 0.47%. (Knapp-USGS)
W74-04260

ON SALTWATER HOT SPRINGS IN THE COAST AREA OF WESTERN ANATOLIA, TURKEY (UBER SALZWASSER-THERMEN IM KUSTENLAND VON WEST-ANATOLIEN, TURKEI),
Aegean Univ., Bornova (Turkey).
R. Brinkmann, and R. Kuhn.
Chemical Geology, Vol 12, No 3, p 171-187, November 1973. 8 fig, 3 tab, 32 ref. English summary.

Descriptors: *Hot springs, *Water circulation, Sea water, Brines, Trace elements, Density, *Saline water.
Identifiers: *Turkey(Anatolia).

The geological positions of 8 hot springs from the Karaburun coast, the Catalkaya Mountains, and the Biga Peninsula, all situated in western Turkey, are described. The interpretation is based on chemical analyses of waters, especially the Br-, Rb- and D-contents. The hot springs from Karaburun and Catalkaya are mixtures of seawater and freshwater. The hot spring of Tuzla in the Biga Peninsula discharges a mixture of seawater and brine originating either from a rock salt deposit or from oil fields. The temperature of the springs (21-91 C) suggests that seawater infiltrates to a depth of 2-3-1/2 km. The rise of the water above ocean level is explained by density differences between descending and rising water. (Knapp-USGS)
W74-04270

2G. Water In Soils

AN EXPERIMENTAL STUDY OF SOIL WATER FLOW SYSTEMS INVOLVING HYSTERESIS,
Colorado State Univ., Fort Collins. Dept. of Agronomy.
A. Klute, and R. W. Gillham.
Availability from NTIS as PB-227 236 $3.00 in paper copy, $1.45 in microfiche. Environmental Resources Center, Colorado State University, Fort Collins, Completion Report Series No 51, August 1973. 31 fig, 27 ref, append. OWRR A-014-COLO(2).

Descriptors: Flow, *Soil water, Unsaturated flow, *Hysteresis, Retention, Unsteady flow, Tensiometers, Tensile strength, *Hydraulic conductivity, *Measurement, *Pressure head, Nuclear moisture meters, Pressure measuring instruments.
Identifiers: Tensiometry.

The hydraulic functions, i.e., hydraulic conductivity-water content and pressure head-water content relationships, were measured in an unsteady state flow situation on a column of sand using gamma absorption for water content measurements and pressure transducer tensiometry for pressure head measurements. Subsequently, the same flow column was subjected to a boundary condition that caused drainage and rewetting of the column. Measurements of pressure head, hydraulic head and water content versus time were made at various positions. These data were compared with the predictions from soil water flow theory which included the effects of hysteresis in the water content-pressure head relationship. Measured and predicted pressure head-time curves were in reasonable agreement, but measured and predicted water content-time curves were not always in good agreement.
W74-03760

EVALUATION OF WATER FLUX ABOVE A DEEP WATER TABLE USING THERMOCOUPLE PSYCHROMETERS,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
C. G. Enfield, J. J. C. Hsieh, and A. W. Warrick.
Soil Science Society of Amercica Proceedings, Vol 37, No 6, p 968-970, November-December 1973. 3 fig, 12 ref. AEC Contract 945-1-1830.

Descriptors: *Hygrometry, *Soil water movement, *Unsaturated flow, Instrumentation, Moisture content, Moisture meters.
Identifiers: *Thermoccouple psychrometers.

Deep water flow was evaluated in a Washington desert environment using hydraulic conductivity and potential gradients. Thermocouple psychrometers and temperature transducers were installed to depths of 94 m in the soil profile and used to measure the potential gradients. The hydraulic conductivity was calculated using a modified Millington and Quirk equation and the soil moisture characteristic curve. The thermal fluid diffusivity was calculated and used to estimate flow induced by thermal gradients. If flow existed at this location, it was less than 1 cm/year. (Knapp-USGS)

W74-03776

SELF-DIFFUSION COEFFICIENTS OF SELECTED HERBICIDES IN WATER AND ESTIMATES OF THEIR TRANSMISSION FACTORS IN SOIL,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-03778

VACUUM EXTRACTORS TO ASSESS DEEP PERCOLATION LOSSES AND CHEMICAL CONSTITUENTS OF SOIL WATER,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 7B.
W74-03779

THE SIMULTANEOUS EFFECT OF PH AND CHLORIDE CONCENTRATIONS UPON MERCURY (II) AS A POLLUTANT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-03782

THE WATER-ICE PHASE COMPOSITION OF CLAY-WATER SYSTEMS: I. THE KAOLINITE-WATER SYSTEM,
Cold Regions Research and Engineering Lab., Hanover, N. H.
D. M. Anderson, A. R. Tice, and A. Banin.
Soil Science Society of America Proceedings, Vol 37, No 6, p 819-822, November-December 1973. 2 fig, 1 tab, 19 ref.

Descriptors: *Frozen soils, *Clay minerals, *Ice, *Soil moisture, Cryology, Adsorption, Freezing, Frost, Soil water, *Kaolinite, Clays, Frozen ground, Soil physical properties, Soil physics.

When water-ice phase composition curves are normalized to unit surface area, unfrozen water content values at all temperatures are higher for the kaolinite-water system than for other clay-water systems. In addition, the water-ice phase composition curve for this system is the resultant of the superposition of two power curves. Values of the unfrozen water content per unit surface area for the kaolinite-water systems are more than twice as large as those for the montmorillonite-water systems. Addition of polyethylene oxide to the kaolinite-water system had little effect on water content in the range of 0 to 1.7 but diminished water content significantly at values of more than 1.7. The observations are explained qualitatively in terms of a domain model of clay-imbibed water. (Knapp-USGS)
W74-03783

WATER VAPOR MOVEMENT THROUGH MULCHES UNDER FIELD CONDITIONS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
B. A. Kimball.
Soil Science Society of America Proceedings, Vol 37, No 6, p 813-818, November-December 1973. 3 fig, 2 tab, 24 ref.

Descriptors: *Soil water movement, *Evaporation, *Diffusion, Lysimeters, Wettability, Soil physical properties, Mass transfer, Dispersion, Soil physics, Wetting, Soil surfaces, Air-earth interfaces, Water vapor.
Identifiers: *Mulches.

The loss of water vapor through 0.5-, 1-, and 2-cm depths of water repellent mulches was measured under field conditions with lysimeters. Measurements were made of wind velocities, air vapor pressures, and temperatures at the soil-mulch interfaces. Mulches used included 0.5-, 1-, and 2-mm glass beads and 1-mm glass bead aggregates. By assuming that the relative humidity of the soil air at the soil-mulch interface was essentially 100%, effective diffusion coefficients for field conditions were calculated. The average effective diffusion coefficient for afternoon periods was 1.26 times greater than molecular diffusion coefficient. Little correlation was found between wind velocity and effective diffusion coefficient. (Knapp-USGS)
W74-03784

BEHAVIOR OF COHESIVE MATERIAL FROM A SOIL ENGINEER'S VIEWPOINT,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W74-03798

THE HYDRAULICS OF ARTIFICIAL RECHARGE,
Technische Hogeschool, Delft (Netherlands).
For primary bibliographic entry see Field 4B.
W74-03820

NITRATE DETERMINATION BY A MODIFIED CONWAY MICRODIFFUSION METHOD,
Agricultural Research Service, Beltsville, Md. Plant Physiology Inst.
G. Stanford, J. N. Carter, E. C. Simpson Jr., and D. E. Schwaninger.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1365-1368, November 1973. 1 fig, 3 tab, 8 ref.

Descriptors: *Nitrates, *Soil analysis, *Ammonium, Nitrogen, Water analysis, Pollutant identification.
Identifiers: Conway microdiffusion method, Sample preparation, Chemical interference, Recovery.

The proposed modified Conway microdiffusion method provides for consecutive determinations of NH4- and NO3-N in a given aliquot of soil extract. Analysis is performed by pipetting soil extract into the peripheral chamber of an Obrink-Conway microdiffusion dish, pipetting boric acid solution into the center well, adding K2CO3 to the outer moat and the sample chamber of the dish, and sealing the dish with the cover. After 16 hrs or more the diffused NH4N is titrated. Devarda's alloy is then added to the sample chamber, and NO3 N is titrated after 16 hrs or more. To measure (NH4(plus)NO3)-N, Devarda's alloy is added to the sample chamber first. Analyses of primary nitrate standards showed essentially complete recovery in the range of 1 to 20 ppm NO3-N(4 to 80 micrograms N/aliquot). Results for(NH4(plus)NO3)-N and NO3-N in soil extracts are comparable to those obtained, respectively, by macrodistillation with Devarda's alloy and by the phenoldisulfonic acid colorimetric method. The method is rapid and suitable for routine analyses of soil extracts, the equipment is inexpensive, and no interferences are apparent. (Little-Battelle)
W74-03845

INVESTIGATION OF THE DYNAMICS OF THE MOISTURE STATE OF THE SOIL UNDER SEVERAL YEARS OF FORAGE CROPS AND UNDER SAINFOIN, (IN CZECH),
Vyzkumny Ustav Rastlinnej Vyroby, Piestanoch (Czechoslovakia).
For primary bibliographic entry see Field 3F.
W74-03917

INTEGRATING NATURAL RESOURCES INTO AREAWIDE AND LOCAL PLANNING: THE SOUTHEASTERN WISCONSIN EXPERIENCE,
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 6B.
W74-03965

WATER RENOVATION FOR UNRESTRICTED RE-USE,
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-04034

SOIL MOISTURE TRENDS ON SAGEBRUSH RANGELANDS,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
W. J. Rawls, J. F. Zuzel, and G. A. Schumaker.
Journal of Soil and Water Conservation, Vol 28, No 6, p 270-272, Novermber-December 1973. 4 fig, 1 tab, 5 ref.

Descriptors: *Soil moisture, *Grasslands, *Water storage, Seasonal, *Idaho, Soil water, Evapotranspiration, *Sagebrush, *Range management.

In 1966 and 1967 three networks of soil moisture access tubes were established on Idaho's Reynolds Mountain Watershed, a mountainous area near Boise with elevations from 3,600 to 7,200 feet. These networks represent a range of soils, elevations, and precipitation zones. Biweekly monitoring with a neutron soil moisture probe allowed the derivation of an average annual soil moisture curve for the top 3 feet of soil in each area. These curves showed that maximum soil moisture accumulation occurred in late February at the low elevations and in late May at the high elevations. Minimum soil moisture occurred in July and August. Maximum soil moisture accumulation varied from 8 to 18 inches of water. The depletion rate between minimum and maximum soil moisture was approximately linear with a total depletion of 2.5 to 4 inches of water. (Knapp-USGS)
W74-04074

EFFECT OF ENVIRONMENTAL FACTORS ON ALGAE COUNT IN THE MAIN SOIL TYPES OF THE ESTONIAN SSR (IN ESTONIAN),
Akademiya Nauk Estonskoi SSR, Tallinn. Inst. of Experimental Biology.
H. Rüs.
Eesti Nsv Tead Akad Toim Biol, Vol 21, No 3, p 199-206, 1972, Illus, English summary.
Identifiers: *Algae count(Soils), Environmental studies, Shale oil, *Soil treatment, *USSR(Estonian-SSR), *Soil moisture, Soil temperature.

The soil algae count and its dependence on various factors (moisture and temperature of the soil, treatment with shale oil and its components) were determined in regard to the main soil types of the Estonian SSR over a 2 yr period. Soil samples were taken the year round from 14 biometers. Soil moisture and temperature affect the count of soil algae either directly or indirectly. It appears that the count was more strongly affected by moisture. A moisture content of about 25-45% is most favorable for the development of soil algae. The algae count of the examined soil types did not decrease in accordance with low temperature (-4.3 to 5 deg C). With rising temperature the count decreased constantly, reaching its minimum at about 10-17.8C, according to the soil type. The treatment of soils with shale oil (1 ton/ha) and its components (0.5 ton/ha) had no effect on the algae count.--Copyright 1973, Biological Abstracts, Inc.
W74-04114

GROSS CHEMICAL COMPOSITION OF MURGAB OASIS DESERTIFIED AND ANCIENT-IRRIGATION SOILS (IN RUSSIAN),
For primary bibliographic entry see Field 3C.
W74-04123

SEASONAL VARIATIONS OF THE SALINITY IN SOME PROFILES AND IN THE WATER

TABLE OF THE SODIC SOILS OF CAMARGUE: PRELIMINARY RESULTS (IN FRENCH),
Institut National de la Recherche Agronomique, Montpellier (France). Service d'Etude des Sols.
J. Servant.
Bull Assoc Fr Etude Sol. 6. p 23-31, 1971, Illus, English summary.
Identifiers: Absorption, Arthrocnemum, Electrical conductivity, *France(Camargue), Salicornia, Salinity, *Seasonal, Sodium, *Soils(Sodic), Soil profiles, Water table, Saline soils, Halophytes.

The soils were situated in Camargue, between the Rhone River and Vaccares pond, in southern France. They corresponded to the saline spots being developed in the cultivated zones where the plants are stunted or absent. A profile was studied in 'Sansouire' which is a very saline zone exclusively colonized by halophytes (Arthrocnemum, Salicornia). In the sector concerned (Mas du Grand Manusclat) 5 saline spots and a spot in the Sansouire were selected. The soils and the water tables were sampled 6 times during a period from Nov. 1970 to Sept. 1971. The specific characteristics of saline spots are given and the changes in the salinity during the year are shown. Correlations were established between the electrical conductivity and sum of anions as well as between the sodium adsorption ratio and sum of anions. The mean annual values, with their standard deviations, were found, and calculation of the coefficients of the variation characterized the fluctuations of salinity and alkalinity. The coefficients of variation were higher in less saline soils as compared to the highly saline soils.--Copyright 1973, Biological Abstracts, Inc.
W74-04124

APPRECIATION OF THE FITNESS FOR UTILIZATION OF THE SOILS OF PROVENCE,
G. Duclos.
Bull Assoc Fr Etude Sol. 6. p 33-46, 1971, Illus.
Identifiers: Exchange capacity, *France(Provence), Moisture, Nitrogen, Phosphorus, Potassium, *Soils, *Mapping, Hydrogen ion concentration.

The factors on which the fitness of soils for utilization depend are depth of the loose soil in the root zone, texture and granulometry, pebble content, limestone content and the potential fertility which includes pH, organic matter, N, P, and K, and the total exchange capacity. The reserve of readily utilizable water, internal drainage and factors of relief, topography and climate are described. Soils are put in 7 classes by their favorable or unfavorable characteristics and various types of soils in Provence are described and classified. The aptitude of these classes for cultivation is described. A map is given with the classes of soil indicated and also the various limitations such as salinity, active limestone, erosion, slope and texture.--Copyright 1973, Biological Abstracts, Inc.
W74-04125

DRY LAND RESEARCH IN NORTHWEST INDIA. I: EFFECT OF VARIABLE PRE-PLANTING TILLAGE ON SOIL MOISTURE, GROWTH, AND YIELD OF PEARL MILLET (PENNISETUM TYPHOIDES, S. AND H),
Haryana Agricultural Univ., Hissar (India). Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-04128

SELECTING A METHOD FOR SCHEDULING IRRIGATION, USING A SIMULATION MODEL.
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-04134

GRAIN SORGHUM RESPONSE TO TRICKLE AND SUBSERFACE IRRIGATION,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-04137

MOVEMENT OF NITRATES UNDER IRRIGATED AGRICULTURE,
Nebraska Univ., Lincoln. Coll. of Engineering and Architecture.
For primary bibliographic entry see Field 5B.
W74-04139

GYPSUM AS IMPROVER OF THE PERMEABILITY OF GRUMUSOL (TYPIC PELLUSTERT) IN THE KANO PLAINS OF KENYA,
National Agricultural Research Lab., Nairobi (Kenya).
N. N. Nyandat.
E Afr Agric For J. Vol 38, No 1, p 1-7. 1972. Illus.
Identifiers: Electrolytes, *Grumusol, *Gypsum, *Kenya(Kano Plains), Moisture, Mulching, *Permeability, Plains, Sodium, Typic pellustert.

The effect of initial moisture content, rate of wetting, soil electrolyte concentration, and the level of exchangeable Na on the usefulness of gypsum as improver of permeability was examined for a grumusol. The improvement of permeability seems to be most effective at a moisture tension around 1 atm and when the soil is slowly wetted. Field incorporation of gypsum may therefore seem to require that it be applied when the soil is not too moist and not too dry and that following application the soil be protected from direct impact of large rain drops by mulching. The beneficial effect of gypsum on the soils under consideration appears to depend on maintaining the soil electrolyte concentration at a level above 11.52 me/l gypsum solution. Also the effect does not lead to a permanent improvement of permeability or a permanent stabilization of the structure of the soil. Once the soil is depleted of salt, reapplication of gypsum does not restore permeability to adequate level. The application of gypsum on these soils therefore should be continual and should be done before the soil electrolyte becomes too dilute. Gypsum is effective even when the soils contain high levels of exchangable Na. The effect of exchangeable Na, however, appears uniform at levels above 5.4% and there does not seem to be a correlation between exchangeable Na percentage and permeability.--Copyright 1973, Biological Abstracts, Inc.
W74-04193

DRAINAGE DESIGN AS INFLUENCED BY CONDITIONS IN THE VICINITY OF THE DRAIN LINE,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 4A.
W74-04200

DIVISION OF THE CISBAYKAL REGION INTO ZONES ON THE BASIS OF MOISTURE AND HEAT AVAILABILITY (RAYONIROVANIYE TERRITORII PREDBAYKAL'YA PO STEPENI UVLAZHNENIYA I TEPLOOBESPECHENNOSTI),
Institute of Geography of Siberia and the Far East, Irkutsk (USSR).
N. S. Berkin.
Institut Geografii Sibiri i Dal'nego Vostoka Doklady, No 32, p 33-40, 1971. 1 fig, 1 tab, 19 ref.

Descriptors: *Moisture, *Moisture availability, *Heat, Heat balance, Seasonal, Water balance, Precipitation(Atmospheric), Evaporation, Runoff, Water storage, Equations, Maps.
Identifiers: *USSR(Cisbaykal region).

Division of the Cisbaykal region into zones was based on analysis of space-time distribution of water- and heat-balance items and of various heat- and moisture-availability indices computed for 110 points in the Irkutsk Oblast and the southwestern part of Buryat ASSR. Maximum moisture is observed in April when the soils are wetted by snow waters. In May-June, moisture content decreases as a result of a sharp increase in heat supplies. An increase in moisture content during the second half of summer due to rainfall continues until spring of the following year. Maximum values of moisture- and heat-availability indices occur in mountainous regions where a precipitation excess and heat deficiency are observed. Minimum values occur in forested steppe and steppe regions where there is a moisture deficit. Two hydrologic-climatic zones are distinguished in the region: (1) the zone of abundant moisture, covering 37% of the region; and (2) the zone of optimal moisture, covering 63% of the region and including a small zone of moisture deficit. (Josefson-USGS)
W74-04254

A LANDSCAPE ZONATION FOR THE SOUTHERN AND CENTRAL MACKENZIE RIVER VALLEY BASED ON TERRAIN PERMAFROST CHARACTERISTICS,
Northern Forest Research Center, Edmonton (Alberta).
For primary bibliographic entry see Field 2C.
W74-04266

SPECTROPHOTOMETRIC DETERMINATION OF HEXACHLOROBUTADIENE (HCBD) IN SOIL AND WATER, (IN RUSSIAN),
Akademiya Nauk Moldavskoi SSR, Kishinev.
For primary bibliographic entry see Field 5B.
W74-04293

2H. Lakes

WATER BALANCE OF A SMALL LAKE IN A PERMAFROST REGION,
Alaska Univ., College. Inst. of Water Resources.
C. W. Hartman, and R. F. Carlson.
Availability from NTIS as PB-227 241 $3.00 in paper copy, $1.45 in microfiche. Report No IWR-42, September 1973, 23 p, 7 fig, 2 tab. OWRR A-031-ALAS(4). 14-01-0001-3002.

Descriptors: Climates, *Alaska, Cold regions, *Groundwater, *Lakes, Hydrologic budget, *Drawdown, *Permafrost, *Water balance, Peat, Arctic.
Identifiers: *Fairbanks(Alas), Sub-permafrost, Pumped drawdown.

Lakes form an important water resource in arctic permafrost areas. Although normal groundwater flow in permafrost areas is confined to the active layer, potential interconnections exist between lakes and the underlying sub-permafrost groundwater aquifer. The existance of these interconnections was examined by pumping water from a small thaw lake near Fairbanks, Alaska. The induced drawdown allowed study of the dynamics of the active layer surrounding the lake and determination of the amount of groundwater recharge into the lake. The drawdown tests indicated that there is little hydraulic connection between the lake and the sub-permafrost groundwater system. The lake probably routinely fills with water during the spring runoff and is controlled throughout the summer season by rainfall, evaporation and from a small amount of recharge from the shallow peat layer surrounding the lake after intense rainstorms.
W74-03758

A FEASIBILITY STUDY OF A RESEARCH PROGRAM ON THE SOURCE, DEGRADATIVE

REMOVAL AND SECONDARY CONSEQUENCES OF PETROLEUM PRODUCTS IN WATER,
New Hampshire Univ., Durham. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-03767

TROPHIC LEVEL INTERRELATIONSHIPS IN CAYUGA LAKE, NEW YORK,
Cornell Univ., Ithaca, N. Y. Water Resources and Marine Sciences Center.
D. G. Hennick, W. D. Youngs, and R. T. Oglesby.
Availability from NTIS as PB-227 233 $4.00 in paper copy, $1.45 in microfiche. Technical Report 75, November 1973. 85 p, 6 fig, 8 tab, 22 ref, 8 append. OWRR A-041-NY(1). 14-31-0001-3832.

Descriptors: *Trophic level, *Zooplankton, Data collections, *Biomass, *Lakes, *Growth rates, Water resources, Fish food organisms, Seasonal, Population, Forage fish.
Identifiers: *Alewives, *Lake Cayuga(NY), Finger Lakes(NY), Clupeids.

Presented are the results of a research investigation of the relationship of alewife growth rate and foraging effort to zooplankton standing crop. Data were collected from Lake Cayuga, New York and consisted of length-frequency measures of alewives and zooplankton, and catch/per unit of alewives. Alewife samples were caught in specially designed experimental gill nets. Seasonal variance in the growth rate of yearling alewives in Cayuga Lake can be accounted for solely by fluctuations in food supply; growth rate is not affected by summer range temperatures. Evidence from both gill net catch per unit effort, and the relationship between alewife growth rate and zooplankton concentration indicated that alewife foraging effort is proportional to food supply. Zooplankton standing crop is a vital measure of the food supply of alewives. (Bell-New York)
W74-03769

DISTRIBUTION OF ZR, TI, NI, CO, PB, CU, AND OTHER ELEMENTS IN THE SURFACE LAYER OF RECENT SEDIMENTS OF LAKE BALKHASH (RASPREDELENIYE ZR, TI, NI, CO, PB, CU I DRUGIHK ELEMENTOV V POVERKHNOSTNOM SLOYE SOVREMENNYKH OSA DKOV OZ. BALKHASH),
Adademiya Nauk SSSR, Moscow. Geologicheskii Institut.
D. S. Turovskiy, I. Yu. Lubchenko, and Ye. V. Cherkasova.
Litologiya i Poleznyye Iskopayemyye, No 1, p 47-55, January-February 1973. 3 fig, 2 tab, 7 ref.

Descriptors: *Lake sediments, *Bottom sediments, *Recent epoch, *Trace elements, *Metals, Chromium, Titanium, Iron, Manganese, Cobalt, Nickel, Lead, Copper, Molybdenum, Phosphorus, Calcium carbonate, Silts, Sands, Maps.
Identifiers: *USSR(Lake Balkhash), Ili River, Oozes, Zirconium, Gallium, Vanadium, Germanium, Organic carbon.

The composition of suspended material carried into Lake Balkhash by the Ili River includes Zr (0.032%), Ti (0.42%), Cr (0.007%), V (0.0106%), Fe (3.6%), Mn (0.07%), Co (0.0015%), Ni (0.0029%), Cu (0.0037%), Pb (0.0043%), P (0.096%), Ga (0.0017%), Ge (0.0001%), and Mo (0.00007%). These elements are divided into four groups according to areal distribution and accumulation in different sediment types. The first group consists of the geochemically least mobile elements Zr and Ga. The second consists of V, Cr, Ti, and probably, Ge. The third group is composed of Fe, Mn, Co, Ni, Pb, Cu, and P--the geochemically most mobile elements. The fourth group consists of Mo and organic C. Bottom sediments of the lake are divided into medium-grained sands, fine-grained sands, coarse silts, fine silty calcareous and calcareous-dolomitic oozes, and silty-pelitic calcarious and calcareous-dolomitic oozes. Fine silty and silty-pelitic oozes are rich in Fe, P, Mn, Co, Ni, Cu, and Pb. Zr is accumulated in littoral zones composed of sands. Ti, V, and Cr concentrations are highest in sediments consisting of coarse silts and fine silty oozes. The relation between the distribution of elements and the hydrodynamic regime of the lake basin is mapped. (Josefson-USGS)
W74-03827

LAKES OF THE BOL'SHOY PATOK RIVER BASIN (NORTHERN URALS). THEIR IMPORTANCE AND PRESERVATION (OZERA BASSEYNA R. BOL'SHOY PATOK (PRIPOLYARNYY URAL), IKH ZNACHENIYE I OKHRANA).,
L. P. Goldina.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 105, No 5, p463-465, September-October 1973. 6 ref.

Descriptors: *Lakes, *Lake morphometry, Lake morphology, Lake shores, *Lake basins, Lake beds, Lake fisheries, Thermal properties, Water quality, Tourism.
Identifiers: *USSR(Komi ASSR), Bol'shoy Patok River, Mineralization.

To obtain more complete data on lakes formed in mountainous terrain, limnological investigations were carried out in the summer of 1972 in the Bol'shoy Patok River basin in the Komi ASSR. Morphometric parameters were determined for 3 mountain lakes: Sigovoye, Lesnoye, and Podgornoye. For Lake Sigovoye, the surface area is 0.2 sq km; mean depth is 7.4 m; maximum depth is 27.3 m; volume is 1.4 million cu m; and shoreline length is 2.5 km. For Lake Lesnoye, the surface area is 0.2 sq km; mean depth is 6 m; maximum depth is 24 m; volume is 1.3 million cu m; and shoreline length is 2.5 k.m For Lake Podgornoye, the surface area is 0.3 sq km; mean depth is 4.3 m; maximum depth is 14.0 m; volume is 1.4 million cu m; and shoreline length is 1.8 km. Lakes Sigovoye and Lesnoye are similar in hydrochemical characteristics. The reaction of water of both lakes is weakly acidic (pH 6.9-7.0). Total hardness is 0.53-0.63 meq/liter. Waters of both lakes have a relatively low mineralization (4.62-6.38 mg/liter), and their chemical composition is of the sodium-sulfate type. Reaction of water of Lake Podgornoye is acidic (pH 6.0-6.3). In hardness characteristics, the lake water is classified as soft. The water has a low mineralization (3.64 mg/liter), and its chemical composition is of the sodium-sulfate type. The importance of these lakes for the fishery economy and tourism is noted. (Josefson-USGS)
W74-03832

IRON ORE IN LAKES OF VOLOGDA OBLAST (ZHELEZORUDNYYE OZERA VOLOGODSKOY OBLASTI),
G. A. Vorob'yev.
Vsesoyuznoye Geograficheskoye Obshchestvo Izvestiya, Vol 105, No 2, p 170-174, March-April 1973. 1 fig, 1 tab, 13 ref.

Descriptors: *Limnology, *Lakes, *Iron, *Iron compounds, *Iron oxides, Oxides, Lake morphometry, Thermal properties, Thermal stratification, Bottom sediments, Maps.
Identifiers: *USSR(Vologda Oblast), *Iron ore.

Limnological investigations were conducted in the summer of 1971 in Vologda Oblast in north-central Soviet Russia to determine ore formation in 6 lakes of the Shimozero group and in Lake Lozsko-Azatskoye. Iron ores were discovered in bottom sediments of 3 lakes of the Shimozero group--Shimozero, Maslozero, and Yandozero. Fe203 concentrations in concretions are high, varying between 47.0% and 67.4%. Low MnO concentrations (0.24%-0.87%) and comparatively high P205 concentrations (3.07%-4.25%) in the iron formations are not representative of iron-ore formations in lakes of Scandinavia or the Karelian Isthmus. In the southern part of Lake Lozsko-Azatskoye, iron ores were observed in sandy-gravelly deposits at a depth of 2-4 m. Concretions contain 47.00%-67.40% Fe203, 4.00%-5.50% Si02, 0.70%-1.26% CaO, less than 0.10% MgO, 3.04%-3.73% P205, 0.82%-0.87% MnO, and 0.02%-0.08% Ti02. The concretions are similar in composition to iron-ore formations in the Shimozero group of lakes. (Josefson-USGS)
W74-03833

ZONATION OF AQUATIC AND SWAMP VEGETATION, (IN RUMANIAN),
Bucharest Univ. (Rumania).
G. A. Nedelcu.
An Univ. Bucur Biol Veg. 20 p 193-201. 1971, Illus.
Identifiers: Aquatic plants, Forest, Romanis, *Swamp vegetation, *Zonation.

Studies were made of the zonation of aquatic and swamp vegetation of the Romanian lowlands. A system of 3 zones is presented: pelagic zone with a trophogenic and tropholytic area, the littoral zone with water, semiwater and shore belts, the border or forest zone with mesophilic meadows and shore forests. Examples of aquatic and swamp vegetation are given for each zone.--Copyright 1973, Biological Abstracts, Inc.
W74-03843

A STUDY OF MERCURIALS IN THE ELEPHANT BUTTE RESERVOIR ECOSYSTEM,
New Mexico Univ., Albuquerque. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-03899

MONTEZUMA WELL, ARIZONA, AS A HABITAT,
Arizona State Univ., Tempe.
W. T. Barry.
Journal of the Arizona Academy of Science, Vol 8, No 1, p 7-13, February 1973. 4 fig, 2 tab, 5 ref. NSF Grants 13161 and GB-154.

Descriptors: *Lake bottom springs, *Aquatic habitats, *Water temperature, *Lake sediments, Water chemistry, *Lake beds, Springs, Bodies of water, Biomes, Limestones, Karst, Karst hydrology, Sinks, Land subsidence, *Arizona.
Identifiers: Montezuma Well(Ariz).

This study examines Montezuma Well, a deep limestone lake in a semi-arid environment in Yavapai County, Arizona, as a biological habitat. The lake has an area of 0.76 ha and a maximum depth of 17 m, excluding water inlet fissures which are at least 42 m deep. Water enters through these fissures at anywhere between 4,150 to 7,300 cubic meters per day. Influent water was found to be at an almost constant 24 degrees C. Samples were not turbid, although mean Secchi disc transparency is 3.02 m at the level where 80 percent incident radiation has been absorbed. Calcium bicarbonate and sodium chloride are the predominant ions in solution. The pH ranges from 6.2 to 6.9, implying a free carbon dioxide level from 135 to 690 mg/l. This gas entering with the influent water is responsible for the striking anomalies (circa 25,000 BP) in radiocarbon dates from modern plants from within the well. (Muller-Arizona)
W74-03925

A COMPARATIVE STUDY OF PLANKTON RESPIRATION IN AN ACID POLLUTED LAKE AND ITS ACID FREE EMBAYMENTS,
West Virginia Univ., Morgantown. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-03935

AN ECOLOGICAL EVALUATION OF A THERMAL DISCHARGE. PART II: THE DISTRIBUTION OF PHYTOPLANKTON AND PRIMARY PRODUCTIVITY DURING NEAR THE WESTERN SHORE OF LAKE ERIE,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W74-03936

LAKE KINNERET: PLANKTONIC POPULATIONS DURING SEASONS OF HIGH AND LOW PHOSPHORUS AVAILABILITY,
Kinneret Limnology Lab., Tiberias (Israel).
For primary bibliographic entry see Field 5C.
W74-03937

SOME ENVIRONMENTAL FACTORS DETERMINING THE PRIMARY PRODUCTION OF THE MOZHAISK RESERVOIR, (IN RUSSIAN),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 5C.
W74-03939

SPECIES DIVERSITY OF CHYDORID FOSSIL COMMUNITIES IN THE MISSISSIPPI VALLEY,
Wayne State Univ., Detroit, Mich. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-03941

PRIMARY PRODUCTION AND DESTRUCTION OF ORGANIC MATTER IN 2 LAKES OF DIFFERENT TYPES, (IN RUSSIAN),
Gorkii State Univ. (USSR). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-03944

PROTEOLYTIC ACTIVITY OF SAPROPHYTIC MICROFLORA IN THE DNEPRODZERZHINSKOE RESERVOIR, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W74-03949

THE BIOLOGY OF PIKE PERCH IN THE ARNASAYA LAKES SYSTEM, (IN RUSSIAN),
Tashkent Univ. (USSR).
N. M. Khalmatov.
Uzb Biol Zh. Vol 16, No 6, p 56-58. 1972.
Identifiers: Biology, Feeding, Lake systems, *Perch(Pike), *Spawning, *USSR(Arnasaya).

A morphological and biological study of pike perch in the Arnasaya lakes system, USSR, is presented. The perch spawns in April of the second and third year. They use the coastal zones as a spawning ground. The yield is high (66, 840-1,018,500) eggs depending on the length and the weight of the fish. It feeds on small and trash fish and occasionally eats its compatriots. Often bits of shrimp are found in the digestive tract.--Copyright 1973, Biological Abstracts, Inc.
W74-03961

ROTIFER PLANKTON IN BRACKISH AND FRESHWATER LOCALITIES IN CENTRAL SWEDEN,
Uppsala Univ. (Sweden). Inst. of Zoology.
For primary bibliographic entry see Field 5C.
W74-04041

DEVELOPMENT OF THREE-DIMENSIONAL NUMERICAL MODELS OF THE GREAT LAKES,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
T. J. Simons.
Canada Department of Environment, Inland Waters Directorate Scientific Series No 12, 1973. 26 p, 9 fig, 1 tab, 63 ref.
Descriptors: *Water levels, *Great Lakes, *Water circulation, *Water temperature, Model studies, Mathematical studies, Numerical analysis, Weather data, Weather forecasting, Storms, Winds, Lake morphology.

A generalized numerical model is described for computing the water levels and the three-dimensional circulation and temperature structure of the Great Lakes. The mathematical-numerical framework is borrowed from numerical weather prediction, storm surge forecasting, and ocean circulation models. In view of the prominence of the boundary-value problem in the modeling of relatively shallow basins, emphasis is placed on the proper treatment of the bottom topography. The model is based on the hydrostatic and the Boussinesq approximations and employs a quadratic relationship between temperature and density anomalies. The equations for the layered system are derived by vertical integration over layers and by defining new vertical velocities relative to the interfaces. Thereby the model allows for rigid horizontal levels, sloping permeable interfaces, moving material interfaces, or any combination of these. The formulation of the finite-differencing scheme is based on considerations of the energy balance of the physical system, and accuracy and economy of numerical computations. The problems of grid dispersion and the treatment of lateral boundaries are investigated with the help of an exact solution obtained for the response of a lake to a time-dependent wind stress simulating the passage of an atmospheric front. (Woodard-USGS)
W74-04051

PRIMARY PRODUCTIVITY IN RELATION TO CHEMICAL PARAMETERS IN CHEAT LAKE, WEST VIRGINIA,
West Virginia Univ., Morgantown. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-04089

DEPENDENCE OF THE GROWTH OF WHITE BREAM AND GOLDFISH ON ENVIRONMENT, (IN BYELORUSSIAU),
T. M. Shawtsova.
Vyestsi Akad Navuk B SSR Syer Biyal Navuk. No 5, p 100-103. 1972.
Identifiers: Environment, Food *Goldfish, *Growth, Season, Temperature, *White bream.

Data on the age composition of catches of white bream and goldfish are presented. The growth of bream by ages, seasons, generations, periods, and bodies of water are given. The effect of abiotic (temperature, water level) and biotic (numbers) factors of the environment on the growth of bream was noted. The growth of goldfish in lakes with different environmental conditions is analyzed. Growth is governed by numbers and food base.--Copyright 1973, Biological Abstracts, Inc.
W74-04090

DIET OF THE MESOCYCLOPS LEUCKARTI (CLAUS) AND LEPTODORA KINDTII (FOCKE) POPULATIONS IN LAKE ILMEN, (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).
L. A. Stepanova.
Gidrobiol Zh. Vol 8, No 3, p 90-92. 1972. Illus.
Identifiers: Bosmina-coregoni, Chydrous-sphaericus, Daphnia-cucullata, Diet, Eudiaptomus-graciloides, Lakes, *Leptodora-kindtii, *Mesocyclops-leuckarti, Productivity, Sida-crystallina, *USSR(Lake Ilmen).

Daily consumption of Daphnia cucullata, Bosmina coregoni, Chydorus sphaericus, Sida crystallina and Eudiaptomus graciloides by M. leuckarti and L. kindtii was studied under laboratory conditions. When the biomass of zooplankton was increased from 0.12-0.36 g/m3, the daily consumption of M. leuckarti increased from 10 to 31% of wet weight; further increases to 0.60 g/m3 caused a slight increase to 34%, which was the highest value observed. The intake of L. kindtii reached a peak at a concentration of 0.36 g/m3 and 20% of wet weight. The productivity of organisms in the first and second trophic levels is calculated for Lake Ilmen (USSR) using these data.--Copyright 1973, Biological Abstracts, Inc.
W74-04091

RESULTS OF ACCLIMATIZATION OF COROPHIUM SOWINSKYI (MART.) IN THE VESELOVSK RESERVOIR, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR). Research Inst. of Biology.
V. M. Kruglova, E. M. Reikh, and L. N. Tapil'skaya.
Gidrobiol Zh. Vol 8, No 5, p 83-86. 1972.
Identifiers: *Acclimatization, *Corophium-sowinskyi, Fish forage, Reservoirs, *USSR(Veselovsk reservoir).

The crustacean Corophium sowinskyi successfully acclimated in the Veselovsk reservoir (USSR), enriching the food base of areas previously extremely impoverished and completely unsuitable for fish foraging. The results of introducing the crustacean in the Veselovsk reservoir give grounds for recommending it for acclimatization in other bodies of water.--Copyright 1973, Biological Abstracts, Inc.
W74-04099

A MEROMICTIC LAKE IN AUSTRALIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
For primary bibliographic entry see Field 5C.
W74-04101

A PROGRAMME FOR STUDIES OF THE RECOVERY OF POLLUTED LAKES. THE EFFECT OF CHEMICAL SEWAGE TREATMENT AND DIVERSION OF SEWAGE,
National Swedish Environment Protection Board, Stockholm.
For primary bibliographic entry see Field 5C.
W74-04105

THE FEEDING OF CARASSIUS AURATUS GIBELIO BLOCH. FROM KAIRAKKUM RESERVOIR, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
L. V. Kondur.
Dokl Akad Nauk Tadzh SSR. Vol 15, No 10, p 50-53. 1972. Illus.
Identifiers: Algae, *Carassius-auratus-gibelio, Detritus, *Feeding, Reservoirs, Silt, *USSR(Kairakkum reservoir), Chlorophyta.

The food content of 33 intestines of C. auratus gibelio fish from Kairakkum reservoir, USSR, was studied. The species varied in length, 20-39 cm, and 9 of them were found with empty intestines. Ten food components were found, mostly green algae, detritus and silt.--Copyright 1973, Biological Abstracts, Inc.
W74-04109

EXPERIMENT IN COMPUTING THE TOTAL PRODUCTION OF ZOOPLANKTON USING URAL LAKES AS AN EXAMPLE (IN RUSSIAN),
Siberian Research Inst. of Pisciculture, Tyumen (USSR).
I. V. Kozlova.
Gidrobiol Zh, Vol 8, No 3, p 130-134, 1972, Illus.
Identifiers: Cladocera, Cyclops, Diaptomids, Fish food, Lakes, Predators, *Production, Protozoa, Rotifers, *Zooplankton, Distribution, *USSR(Ural lakes).

This method of computation involves distribution of all groups of non-predatory zooplankton in the diet of predators according to their production and excludes from real production that portion of protozoan production which is not used by predators. The production of non-predatory zooplankton included that of protozoa, rotifers, Caldocera and diaptomids; the production of predators included that of cyclops, predatory Caldocera and predatory rotifers. This method permitted reliable calculation of the food base of plankton-eating fish. Values for 6 lakes in the Urals, USSR were computed.--Copyright 1973, Biological Abstracts, Inc.
W74-04120

THE MOLLUSK FAUNA OF THE BOLSHOI KARABULAK OXBOW LAKE (VOLGA DELTA), (IN RUSSIAN),
V. V. Pirogov.
Gidrobiol Zh. Vol 8, No 6, p 88-96. 1972. Illus. (English summary).
Identifiers: Desiccation, Lakes, *Mollusk fauna, Oxbow lakes, *Valvata-Piscinalis, Volga delta, *USSR(Bolshoi Karabulak lake), Bottom fauna, *Benthos.

The bottom fauna of the Bolshoi Karabulak oxbow lake (USSR) was studied periodically from 1916. The last observations were conducted in 1960. Since then, the oxbow lake developed into the next stage and became the valvate type, with dominance of Valvata piscinalis (Muller) in its benthos. Totally 19 mollusk species were found in the lake's back-waters. Three of them are autochthonous, and easily survive 11 mo. unfavorable drying. They do not occur in every lake.--Copyright 1973, Biological Abstracts, Inc.
W74-04165

PRIMARY PRODUCTIVITY IN THE CRAPINA-JIJILA LAKE-COMPLEX (DANUBE FLOODED AREA) DURING SEVERE FLOODING,
Bucharest Univ. (Rumania). Faculty of Biology.
For primary bibliographic entry see Field 5C.
W74-04194

FEEDING AND FOOD RELATIONSHIPS OF THE TROUT SALMO ISCHCHAN KESSLER AND WHITEFISH COREGONUS LAVARETUS LUDOGA POLIAKOW OF LAKE SEVAN, (IN RUSSIAN),
S. A. Pivazyan.
Vopr Ikhtiol. Vol 12, No 6, p 1086-1093. 1972.
Identifiers: Amphipods, Coregonus-Lavaretus-Ludoga, Lakes, Plankton, Salmo-Ischchan, Seasonal, *Trout, *USSR(Lake Sevan), *Whitefish, Zooplankton, *Fish food.

Feeding of the trout S. ischchan and whitefish C. lavaretus ludoga under conditions of the continuing lowering of the waters of Lake Sevan (USSR) was studied. An appreciable similarity of the feeding of the trout and whitefish was noted during the spring-summer feeding period, when the fishes consume mainly amphipods. As the amphipods are consumed the role of other benthic organisms increases in the feeding of the trout and the value of zooplankton increases for the whitefish. During the fall and winter the stress of food relations between whitefish and trout decreases in connection with the change of whitefish to feeding almost exclusively on zooplankton. Broadening of the food spectrum of these fishes indicates deterioration of their forage conditions, which occurred as a result of changes of the food base and marked increase of number of whitefishes in connection with lowering of the lake.--Copyright 1973, Biological Abstracts, Inc.
W74-04203

ON THE BREAKING OF WAVES ARRIVING AT AN ANGLE TO THE SHORE,
National Engineering Science Co., Pasadena, Calif.
B. LeMehaute, and R. C. Y. Koh.
Available from NTIS as AD-632 851 for $6.00 paper copy, $1.45 microfiche. NESCO Report SN-134-10, February 1966. 91 p, 9 fig, 3 tab, 14 ref, 2 append. Nonr-4177(00).

Descriptors: *Waves(Water), *Shallow water, *Energy conservation, Shores, *Beaches.
Identifiers: Irrotational gravity wave theory, Breakers.

By using the method of conservation of energy flux between wave orthogonals, the breaking wave characteristics are obtained for waves traveling obliquely to the bottom contours of a straight shoreline. The results of the calculations are presented in the form of nomographs by using the linear and third order irrotational gravity wave theories. Three different breaking criteria are used in these calculations. In particular, a new breaking criterion is proposed for waves breaking on a gentle slope. Some calculations are also performed at the fifth order of approximation and the results compared with the linear and third order cases. (See also W74-04215 and W74-04216) (Sinha-OEIS)
W74-04217

THE OXYGEN CONSUMPTION OF CHIRONOMID LARVAE FROM LOCH LEVEN IN RELATION TO TEMPERATURE,
Stirling Univ. (Scotland). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-04226

EXCHANGEABLE CATIONS IN SOILS OF THE DNIEPER RESERVOIRS,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. K. Palamarchuk.
Hydrobiological Journal, Vol 8, No 5, p 58-61, 1972. 1 fig, 1 tab, 13 ref. (Originally published in Gidrobiologicheskiy Zhurnal, Vol 8, No 5, 1972).

Descriptors: *Reservoirs, *Lake sediments, *Cations, *Cation exchange, *Cation adsorption, Inorganic compounds.
Identifiers: *USSR(Dnieper River), Oozes.

Total exchangeable cations in sediment of Dnieper River reservoirs vary widely, between 6 and 60 meq/100 g of soil. The finer the sediment grain, the greater its exchange capacity. Bivalent cations of calcium and magnesium are predominant in the adsorbing complex of sediments, comprising about 95% of the total ions. The Ca:Mg ratio is much larger in sediments than in Dnieper water or catchment basin soils and ranges from 5-10 in the Kiev Reservoir to 6-14 in other Dnieper reservoirs. Univalent cations of exchangeable potassium, sodium, and ammonium ions are of secondary importance. Exchangeable hydrogen is a relict of terrigenous soil particles and is gradually being replaced by calcium, thereby improving the soil as a habitat for benthic organisms. Composition of exchangeable cations Ca, Mg, K, Na, NH4, and H in oozes of the Kiev, Kremenchug, and Kakhovka Reservoirs in 1968 is tabulated. (Josefson-USGS)
W74-04255

CORRELATION OF ORGANIC CARBON WITH DIFFERENT KINDS OF OXIDIZABILITY IN THE OPEN WATERS OF LAKE BAIKAL,
Limnologicheskii Institut, Irkutsk (USSR).
Ye. N. Tarasova.
Hydrobiological Journal, Vol 8, No 5, p 53-57, 1972. 2 fig, 11 ref. (Originally published in Gidrobiologicheskiy Zhurnal, Vol 8, No 5, 1972).

Descriptors: *Lakes, *Hydrobiology, *Water chemistry, *Organic matter, *Oxidation, Plankton, Biomass, Seasonal, Correlation analysis.
Identifiers: *USSR(Lake Baikal), *Organic carbon.

Organic matter was determined in the southern part of Lake Baikal between July 1967 and July 1969. Organic matter in the surface layer varied between 1.06 mg/liter (July 18, 1969) and 1.50 mg/liter (May 31, 1969), averaging 1.27 mg/liter from March 1968 to December 1968. The content of organic matter decreased slightly with depth. On the basis of averaged quantities for 1968, organic carbon in the 1,300-m layer constituted 82% of the total amount on the surface. Seasonal changes in organic carbon, permanganate oxidizability, and bichromate oxidizability in open waters of Lake Baikal are diagrammed. (Josefson-USGS)
W74-04256

SOME ASPECTS OF THE CA AND SR WEATHERING CYCLE IN THE LAKE KINNERET (LAKE TIBERIAS) DRAINAGE BASIN,
Hebrew Univ., Rehovoth (Israel). Dept. of Soil and Water Science.
For primary bibliographic entry see Field 2J.
W74-04269

TYPE OF SPAWNING GROUNDS AND ECOLOGY OF SPAWNING FOR STINT, OSMERUS EPERLANUS (L.), IN THE RYBINSK RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
M. N. Ivanova, and S. N. Polovkova.
Vopr Ikhtiol. Vol 12, No 4, p 684-692. 1972. Illus.
Identifiers: Ecology, Osmerus-Eperlanus, Reservoirs, *Spawning, *Stint, *USSR(Rybinsk reservoir).

Both 'lake' and 'river' spawning grounds were found in the Rybinsk Reservoir (USSR). They differed by hydrological conditions, time of the spawning period and the age-size composition of the spawners. Fish which had just matured spawned mainly at lake-grounds, while most veteran spawners used the river grounds. Different types of spawning grounds did not indicate 2 types of fish. The division into age groups increased the effectiveness of reproduction for the whole population.--Copyright 1973, Biological Abstracts, Inc.
W74-04277

ORGANIC MATTER OF THE SOIL IN THE KIEV RESERVOIR AND ITS ROLE IN THE DEVELOPMENT OF BENTHIC ALGAE, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W74-04281

ALGAE FROM SOME LAKES IN NORDMARKA NEAR OSLO,
Norsk Instituut for Vannforskning, Blindern.
P. Brettum.
Blyttia. Vol 30, No 4, p 187-197. 1972. (English summary).
Identifiers: *Algae, Lakes, *Norway(Nordmarka), *Physicochemical studies.

Net samples of algae were collected from various lakes in the catchment area in the Oslo water reservoir (Norway). Physical and chemical data are given.--Copyright 1973, Biological Abstracts, Inc.
W74-04289

HYDROBIOLOGICAL STUDIES OF 2 SHALLOW PONDS: OBSERVATIONS ON TEMPERATURE AND PLANKTON DISTRIBUTION AND THE INFLUENCE OF A PLANT COVER CONTAINING LEMNA MINOR, (IN FRENCH),
Centre National de la Recherche Scientifique, Gif-sur-Yvette (France). Laboratoire de Genetique Evolutive et de Biometrie.
R. Pourriot.

Ann Hydrobiol. Vol 3, No 1, p 33-46. 1972. Illus. (English summary).
Identifiers: Circadian, *Hydrobiological studies, *Lemna-minor, *Phytoplankton distribution, *Plant cover, *Ponds, Rhythm, Seasons, Temperature, Weather.

Seasonal variations and circadian fluctuations of temperatures were observed at different depths in 2 small shallow ponds. During sunny weather, the circadian amplitude of temperatures is over 5 degrees and the difference between surface and bottom is up to 10 degrees. The growth of a vegetal mat of L. minor modified the heat exchanges, lowered the temperature fluctuations and induced a rarefaction of the phytoplankton. Some observations show the heterogeneity of plankton distribution. During a circadian cycle, the period of less heterogeneity of the plankton and the temperature is probably at the beginning of the night (23 hr).--Copyright 1973, Biological Abstracts, Inc.
W74-04291

INVESTIGATION OF THE MICROFLORA OF SWAMP ORE AND LAKE WATER BY THE METHOD OF ELECTRON MICROSCOPY, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
For primary bibliographic entry see Field 5A.
W74-04292

UTILIZATION OF AROMATIC COMPOUNDS BY BENTHIC MICROORGANISMS OF A EUTROPHIC LAKE,
Nicolas Copernicus Univ. of Torun (Poland). Inst. of Biology.
For primary bibliographic entry see Field 5C.
W74-04295

CHLOROPHYLL-A AND PHAEOPHYTIN: THEIR RELATIONSHIPS WITH THE CONCENTRATIONS OF NITROGEN AND PHOSPHORUS IN THE SESTON OF LAKE MONATE (NORTH ITALY), (IN ITALIAN),
European Atomic Energy Community, Ispra (Italy). Biology Div.
For primary bibliographic entry see Field 5C.
W74-04300

2I. Water In Plants

AN ECOLOGICAL DESCRIPTION OF A SEMI-ARID EAST AFRICAN ECOSYSTEM,
Colorado State Univ., For Collins. Natural Resource Ecology Lab.
L. D. Harris.
Range Science Department Science Series No 11, January 1972, 80 p, 22 fig, 21 tab, 222 ref.

Descriptors: *Africa, *Semiarid climates, *Ecosystems, *Ecological distribution, Ecology, *Grasslands, *Herbivores, Climates, Soils, Biomes, Habitats, Vegetation.
Identifiers: *Tanzania.

The Mkomazi ecosystem, a semi-arid area in northeastern Tanzania, typifies much of Africa's grazing land resource. The area exhibits the acute bush encroachment, limited water supply, and tsetse fly problems so common to African rangelands. This study of the ecosystem approach to ecological problems is intended as an introduction to the application of systems function to a particular environment where soils are classified as predominantly aridosols, and vegetation categorized as dry montane forest, bush and wooded grassland, seasonally inundated grassland, and bushland. A number of species of large herbivores are identified, with relatively few being found to dominate the animal community structure. Water seems to be the major constraint both directly and indirectly in this structure. Just as there is a difference between food consumption and food utilization, so is there a difference between the quantity of precipitation and the quantity of usable water. Distribution and intensity of rainfall as well as temperature, soil runoff, permeability, and other soil parameters affecting the water retention capacity, play major roles in determining the system's characteristics. Thus greater water stress from west to east limits the herbivore component by lower primary productivity. (Paylore-Arizona)
W74-03923

CALCIUM LOSS FROM PLANT ROOTS DURING OSMOTIC ADJUSTMENT,
Arizona Univ., Tucson.
J. N. E. Frota, and J. W. O'Leary.
Journal of the Arizona Academy of Science, Vol 8, No 1, p 26-28, February 1973. 1 fig, 1 tab, 15 ref.

Descriptors: *Sodium chloride, *Calcium, *Root systems, *Soil-water-plant relationships, *Osmotic pressure, Absorption, Irrigation water, Water quality, Salinity, Water chemistry, Root zone, Halides, Salts, Soil chemistry, Plant physiology, *Saline water.

A change in calcium concentration in plant roots due to the osmotic pressure adjustment occurs when the plant is watered with saline water, as is often the case in arid regions. Radioactively tagged calcium ions were preloaded into the root systems of red kidney bean plants. When these plants were subjected to high sodium chloride water a Ca efflux was noted much greater than in plants used for control which were watered with pure water. A corresponding sodium uptake increase was also noted in the test plants. These findings suggest that in the presence of high external sodium chloride concentration, roots lose divalent calcium ions in exchange for univalent sodium ions. This calcium loss may explain several physiological effects that are contributary to the apparent toxicity of high sodium chloride irrigation waters in the root environment. (Muller-Arizona)
W74-03924

SPONTANEOUS VEGETATION OF THE MURRAY SPRINGS AREA, SAN PEDRO VALLEY, ARIZONA,
California Univ., Los Angeles.
S. L. Woodard.
Journal of the Arizona of Science, Vol 7, No 1, p12-16, February 1972. 3 fig, 13 ref.

Descriptors: *Desert plants, *Shrubs, Semiarid climates, Grasslands, Plant groupings, Biomes, *Arizona, Arid lands, Succession, Deserts, *Vegetation establishment, Riparian plants, Mesquite, Southwest U.S., *Brush.
Identifiers: San Pedro Valley(Ariz), *Chihuahuan Desert, *Thornscrub.

The lower, calcareous bajadas of the upper San Pedro Valley, Arizona, are characterized by dense thornscrub with species representative of the Chihuahuan Desert. Grasses occur only on the floodplains and on small interfluvial depressions. The situation that the desertscrub formation is edaphically controlled and does not represent a recent invasion of grassland similar to that which has been found at higher elevations in Cochise County is suggested by the striking similarity of ecological conditions with those of the Chihuahuan Desert proper, as well as the absence of relict Bouteloua communities typical of desert grasslands. Such thornscrub has been noted as early as 1879, some twenty years before arroyo-cutting began in the area. (Muller-Arizona)
W74-03927

SPECIES COMPOSITION OF FISHES IN THE SANZAR RIVER, (IN RUSSIAN),
N. Raimdzhanov.
Uzb Biol Zh. Vol 16, No 2, p 39-42, 1972.
Identifiers: Composition, *Fish species, Rivers, *USSR(Sanzar River).

Natural borders of this water system are the Turkestan and Mal'guzar mountain ridges, USSR. Incontrast to up to 53 spp. of fishes in neighboring river basins, in the Sanzar river in 1968-1971 13 spp. were recorded. Of these the following 9 spp. are aborigines: Ctenopharngodon idella (Valenciennes), Gobio gobio lepidolaemus (Kessler), Varicorhinus capootaherotensis steinachneri (Kessler), Schizothorax intermedius McClelland, Alburnoides lipunetatus eichwaldi (Filippi), Alburnoides taeniatus (Kessler), Hypophthalmichthus molitrix (Valenciennes), Nemachilus stoliczkoi (Steindachnes), and Nemachilus malapterurus longicauda (Kessler). The following 4 spp. have been introduced: Carassius auratus gilelio (Bloch), Cyprinus carpio Linni, Gambusia affinis holbrookii (Gir), and Ophiocephalus argus.--Copyright 1973, Biological Abstracts, Inc.
W74-03945

DATA ON THE BIOLOGY OF ALBURNUS FILIPPII KESSLER LIVING IN THE WATER RESERVES OF THE ARMENIAN SSR, (IN RUSSIAN),
M. G. Dadikyan.
Biol Zh Arm. Vol 25, No 12, p 68-73. 1972.
Identifiers: *Alburnus-Filipii, Biology, Fertility, Maturity, *Morphology, *USSR(Armenia), Water reserves.

The biology of Alburnus filippii Kessler found in the Armenian SSR was studied. Morphometric data, fertility and coefficient of maturity of the A. filippii are included.--Copyright 1973, Biological Abstracts, Inc.
W74-03953

THE ROTIFERS OF THE SUBMERGED MOSSES AND OTHER BIOTOPES IN THE DAMMED REGIONS OF THE DANUBE AT THE GERMAN-AUSTRIAN FRONTIER, (IN GERMAN),
P. J. Donner.
Arch Hydrobiol Suppl Vol 44, No 1, p 49-114. 1972. Illus. (English summary).
Identifiers: Biotopes, *Danube River, *Mosses(Submerged), *Rotifers.

Rotifers were collected from 38 stations on the shores of dammed and of flowing stretches of the River Danube. The submerged mosses, the detritus, the accumulations of rubbish, the debris, and the drying marginal region were investigated.--Copyright 1973, Biological Abstracts, Inc.
W74-04001

A STUDY OF A GENERALIZED MATHEMATICAL MODEL 'PREDATOR-SACRIFICE,' (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Radiotekhniki i Elektroniki.
V. F. Krapivin.
Ekologiya. Vol 3, No 3, p 28-37. 1972. Illus.
Identifiers: *Mathematical models, *Predator-sacrifice model, Ecology, Ecosystem competition, Survival.

A mathematical model of an ecological system with 3 trophic levels, based upon the Ivlev theory of competition is presented. Survival in the system is studied with respect to the character of bonds between species participating within the potential rotation. The interrelationship of the time of survival in the ecological system to the frequency of encounters of the competing populations was determined.--Copyright 1973, Biological Abstracts, Inc.
W74-04092

FECUNDITY OF THE GRASS CARP CTENOPHARYNGODON IDELLA (VAL.) IN THE AMUR BASIN (IN RUSSIAN),
Tikhookeanskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva i Okeanografii, Khabarovsk (USSR).
E. I. Gorbach.
Vopr Ikhtiol, Vol 12, No 4, p 674-683, 1972, Illus.
Identifiers: Age, Ctenopharyngodon-idella, Fats, *Fecundity, Food, *Grass carp, Length, Population, Spawning, *USSR(Amur River basin), Weight.

Changes in absolute and relative fecundity, length, weight, age, fat content and food supply were analyzed in grass carp from the Middle Amur River (USSR) from 1963-1968. The lowest value for absolute fecundity was observed in an 8 yr old female 67.5 cm long, the highest in a 16 yr old female 96 cm long. The number of eggs depended most on weight, less on length and least on age. With rare exceptions absolute fecundity increased as the length and weight of the female increased within a single age group. The decrease in population fecundity in 1969 was related to the decreased spawning population as a result of fishing, a decrease in the number of older fish and some decrease in the absolute fecundity as a result of unfavorable spawning conditions in 1968.--Copyright 1973, Biological Abstracts, Inc.
W74-04121

BIOECOLOGICAL OBSERVATIONS ON GAMBUSIA AFFINIS HOLBROOKI GIRARD LIVING IN SULFUROUS, WARM AND BRACKISH WATERS (IN ITALIAN),
E. Gelosi.
Boll Pesca Piscic Idrobiol, Vol 25, No 2, p 345-348, 1970, Illus, English summary.
Identifiers: Brackish water, *Ecological studies, *Gambusia-affinis-holbrooki, *Sulfurous water, Salinity, Water temperature.

Some observations are given of a population of G. affinis holbrooki living near a sulfurous spring with temperature from 25 deg-30 deg C and 13% salinity.--Copyright 1973, Biological Abstracts, Inc.
W74-04122

SIMULATION OF THE ENERGY BALANCE OF A GREENHOUSE,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
B. A. Kimball.
Agricultural Meteorology, Vol 11, 1973, p 243-260. 6 fig, 1 tab, 25 ref.

Descriptors: *Model studies, *Solar radiation, *Greenhouses, *Energy budget, Latent heat, Radiation, Microenvironment, Vapor pressure, Environmental control, Air temperature, Soil temperature.

The large amount of sunshine which occurs in arid areas lends itself to greenhouse agriculture. In this investigation, the energy balance of a greenhouse was modeled on a digital computer. Thermal radiative, sensible, latent, and conductive heat were simulated by mathematical expressions dependent on unknown temperatures and vapor pressures. Sun angle elevation and the optical properties of the greenhouse were used to calculate solar radiation. Equations for the energy balance of the system were developed at various points in the greenhouse and were summed to zero. Radiation fluxes and temperature measurements were acquired in a sample greenhouse to provide real data with which to compare values to the simulation. The observed and predicted values agree closely for various environmental conditions imposed upon the greenhouse system. It is concluded that the model can accurately predict the heating and cooling requirements of a greenhouse for evaluation of water use in such a system. (Muller-Arizona)
W74-04126

DROUGHT-AFFECTED MITOCHONDRIAL PROCESSES AS RELATED TO TISSUE AND WHOLE PLANT RESPONSES,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-04127

FIRE CLIMATES IN THE SOUTHWEST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W74-04130

LEAF ORIENTATION OF A COTTON PLANT,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
For primary bibliographic entry see Field 3F.
W74-04132

ABSCISSION PROCESSES IN COTTON: INDUCTION BY PLANT WATER DEFICIT,
Texas A and M Univ., College Station. Dept. of Plant Sciences.
For primary bibliographic entry see Field 3F.
W74-04136

CHANGES IN VESSEL DIAMETER IN TWO SPECIES OF HERBACEOUS PLANTS, (IN RUSSIAN),
L. I. Lipaeva.
Byull Mosk O-Va Ispyt Prir Otd Biol. Vol 77, No 3, p 133-137. 1972. (English summary).
Identifiers: *Hemp, *Herbaceous plants, *Nettle, *Plants(Vessel constriction), Species, Stomata, Transpiration.

Female plants of nettle and hemp had a higher number of stomata and transpired more intensely than male plants. Their vessels also constricted more. Plants grown in sun had a higher number of stomata and greater vessel contriction than those grown in the shade. Leaves located at upper nodes also had a higher number of stomata and longer veins than lower leaves.--Copyright 1973, Biological Abstracts, Inc.
W74-04280

STRUCTURE AND PRODUCTIVITY OF THE PHYTOMASS OF GIGANTIC BUNCH-FORMING GRASSES IN THE AMU DARYA FLOODPLAIN, (IN RUSSIAN),
Akademiya Nauk Turkmenskoi SSR, Ashkhabad. Institut Botaniki.
A. I. Gladyshev, and I. F. Kazakov.
Izv Akad Nauk Turkm SSR Ser Biol Nauk. 3, p 33-39. 1972. Illus.
Identifiers: Erianthus-Ravennae, *Floodplains, Glycyrrhiza-Glabra, *Grasses(Bunch-forming), Phytomass, *Productivity, Saccharum-Spontaneum, Typha-Minima, *USSR(Amu-Darya floodplain), Organic matter.

The below-and above-ground mass of the bunch-forming grass formations along the middle course of the Amu Darya (USSR), their productivity, growth dynamics and litter fall were determined. Synusia of Saccharum spontaneum, Erianthus ravennae, Typha minima and Glycyrrhiza glabra from association of S. spontaneum, S. spontaneum-T. minima and E. ravennae-G. glabra were analyzed. S. spontaneum and E. ravennae produced great amounts of organic mass (40-60 T/ha of absolute dry matter).--Copyright 1973, Biological Abstracts, Inc.
W74-04282

ARCHITECTURE OF RIPARIAN FOREST VEGETATION OF RIVERS AND CREEKS OF FRENCH GUIANA,
Office de la Recherche Scientifique et Technique Outre-Mer, Cayenne (French Guiana). Centre ORSTOM de Cayenne.
A. A. Oldemann.
Adansonia. Vol 12, No 2, p 253-265. 1972. Illus.
Identifiers: Creeks, Erosion, *Forests, *French Guiana, Light availability, *Riparian plants, River, Rivers, Seasonality, *Vegetation.

At first sight, riparian forest vegetation in French Guiana shows a gradual change of mean growth direction from vertical to horizontal at the riverside and a proliferation of vertical offshoots. A more detailed investigation of some ecologically important trees reveals the existence of riparian behavior under the joint ecological gradients of light availability, plant crowding, seasonal decrease of soil cohesion and moderate erosion of meandering rivers, all 'pushing away' from the forest. Besides the change in mean growth direction and numerous offshoots, the vegetation is also distinguished by asymmetric crown development and dense stratification of plagiotrophic branches. These architectural features of riparian forest vegetation do not explain differences existing between its floristic composition and that of the adjacent rain forest, and suggest that its study may yield valuable information about the forest canopy.--Copyright 1973, Biological Abstracts, Inc.
W74-04285

ANNUAL INCREASE OF ABOVEGROUND PHYTOMASS OF SOME TUNDRA SHRUBS, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Geobotany.
E. B. Pospelova.
Vestn Mosk Univ Ser 6 Biol Pochvoved. Vol 27, No 3, p 50-55. 1972. (English summary).
Identifiers: Annual, Betula-Nana, Growth, *Phytomass, Salix-Glauco, Salix-Pulchra, *Shrubs, Snow, Soils, Temperature, *Tundra shrubs, *USSR(Western Taimyr).

The data on the annual increase of green and woody biomass of the shrub layer dominants (Betula nana, Salix pulchra, S. glauca) in the main tundra types of the station 'Agapa' (Western Taimyr, 71 deg 30 min N (USSR) are given. Important factors that influence growth are the depth of thawing, snow cover, and soil temperatures. The highest increase of phytomass is on defended slopes of gullies and depressions of hillocky tundras and bogs; the lowest increase is on open tops of watersheds.--Copyright 1973, Biological Abstracts, Inc.
W74-04286

THE DIATOMACEOUS POPULATIONS IN THE BASIN OF THE MEURTHE RIVER: ATTEMPT AT AN HYDROBIOLOGICAL SYNTHESIS, (IN FRENCH),
Nancy Univ. (France). Laboratoire de Biologie Vegetale.
J-F. Pierre.
Ann Hydrobiol. Vol 3, No 1, p 5-19. 1972. Illus. (English summary).
Identifiers: *Diatomaceous populations, *France(Meurthe River basin), *Hydrobiological studies, Physicochemical studies, River basins, *Algae, Algae growth.

Comparison is made between the physical and chemical water characteristics of the Meurthe river (France) and those of 3 tributaries which flow on different substratums. Consequences on the distribution of the algae are studied. The algal flora of the Meurthe river is the result of a mixing between dominant algal populations which develop in situ and reduced populations proceeding from upstream.--Copyright 1973, Biological Abstracts, Inc.
W74-04288

PRELIMINARY DATA ABOUT THE SEASONAL CHANGES AND VERTICAL STRATIFICATION OF PERIPHYTON FROM THE MIDDLE REACH OF THE RIVER DANUBE,
Slovenske Polnohospodarske Akademie, Bratislava (Czechoslovakia). Laboratorium Rybarstva.
For primary bibliographic entry see Field 5A.
W74-04294

2J. Erosion and Sedimentation

INDICATIONS OF STREAMBED DEGRADATION IN THE WILLAMETTE VALLEY,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
P. C. Klingeman.
Availability from NTIS as PB-227 248 $4.00 in paper copy, $1.45 in microfiche. Oregon State University, Corvallis, Water Resources Research Institute, Project completion report WRRI-21, December 1973. 99 p, 16 fig, 3 tab, 4 ref, append. OWRR A-016-ORE(1).

Descriptors: *Degradation(Stream), Scour, Sediment transport, Erosion, Bed load, *Oregon, Streambeds, Stream erosion, Gaging.
Identifiers: *Willamette River Basin(Ore).

A brief study of possible streambed elevation changes in the Willamette Basin was made to develop techniques for such analysis and to make a preliminary assessment of the extent of any indicated problems of streambed degradation and their likely causes. Records from 11 gaging stations were subject to a 'specific gage' analysis to detect changes in rating curve characteristics. Supplemental information from flood records, aerial photographs, maps, and other sources was then used to attempt an explanation for any indicated changes in the specific gage curves at each station. Several characteristics which might be shown by specific gage curves were developed from general considerations and compared with the curves at the given sites in order to interpret changes. The main-stem Willamette River and nearby portions of some tributaries are subject to water stage lowering, although other streams in the basin are not. Streambed degradation along the main-stem Willamette is approximately 1 foot per decade and may be due to several factors, such as natural geological events, sand and gravel removal, bank stabilization, and watershed changes. However, upstream dams do not appear to have had much effect to date on changes in specific gage for the main-stem.
W74-03770

WATER-SEDIMENT SPLITTER FOR RUNOFF SAMPLES CONTAINING COARSE-GRAINED SEDIMENT,
Agricultural Research Service, Watkinsville, Ga.
W. G. Fleming, and R. A. Leonard.
Soil Science Society of America Proceedings, Vol 37, No 6, p 961-962, November-December 1973. 2 fig, 1 tab.

Descriptors: *Sampling, *Instrumentation, *Sedimentology, Suspended load, Sediment yield, Soil erosion, Runoff.
Identifiers: *Sample splitters.

A water-sediment sample splitter was designed for dividing samples up to 20 liters into three equal and representative smaller samples for chemical and physical analyses. This funnel-shaped device with a mechanical agitator divides samples containing particles up to 2 mm without first separating the sediment from the water. The splitter divides samples containing coarse sediments into three parts with a distribution of 33% + 2% in each. The device has application in assuring representative samples of runoff from watershed or similar runoff studies. (Knapp-USGS)
W74-03780

WIND EROSION AS A FACTOR IN SOIL FORMATION IN THE PIERRE-SHALE LANDSCAPE OF WESTERN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Soil Science.
E. M. White.
Soil Science Society of America Proceedings, Vol 37, No 6, p 919-923, November-December 1973. 3 fig, 29 ref.

Descriptors: *Soil formation, *Wind erosion, *South Dakota, *Aeolian soils, Blowouts, Shales, Clays, Geomorphology.

Slopes exposed to the prevailing NW-SE winds in the Pierre-shale landscape of western South Dakota have been eroded at a slow rate when vegetation was either destroyed by fire or weakened by drought since at least the Pleistocene. Slopes protected from the prevailing winds have had negligible wind erosion except in areas where severe erosion created deflation basins. These blowout basins are limited to small interfluve areas, a few square miles in size, which probably had a thick layer of loose, sand-size fissile-shale fragments that winds could erode. Soils in areas with blowout basins usually are more weakly developed, have shale at shallower depth, have little or no gilgai development, and appear to be younger than soils in comparable areas without deflation basins. Thus, the soil age in these areas is less than would be predicted from the geomorphic relationships to Pleistocene terrace systems. Soils in one area with deflation basins have development comparable to soils derived from late-Wisconsin drift. (Knapp-USGS)
W74-03781

RIVER RESPONSE,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 2E.
W74-03785

FLOW OVER ALLUVIAL BED,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2E.
W74-03786

THE RHEIN STUDY,
California Univ., Berkeley.
H. A. Einstein.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 4, p 4-1--4-18, 1973. 6 fig, 11 ref.

Descriptors: Descriptors, *Sediment transport, *Bed load, *Hydraulic models, Gravels, Hydraulic similitude, Sedimentology, Model studies, Sampling, Shear stress, Alluvial channels.
Identifiers: *Rhine River.

The general study of the transport of sediment by the Rhine River is reviewed. A flume with a 2.0 x 2.0 m cross section and a 50 m usable channel length (which was much later extended to twice that length) was used to model the river. The reach of the river studied is a mountain stream with a gravel bed of 28 mm average grain size. The channel is improved but was at the time of the study steadily aggrading. A set of flume experiments in two scales, one close to prototype scale, the other about 5 times smaller (in linear scale) led to the Meyer-Peter formula for bedload transport. This formula satisfied the Froude similarity between different sizes of sediment. Systematic river measurements of the geometry, the flow conditions and of the sediment transport were carefully coordinated with the studies in the laboratory. The grain-size composition of the bedload transport appears to be almost identical to that of the large gravel bars. The model study of the river channel led to the establishment of similarity rules for the transport of bed material. For the calculation of the bedload transport in a channel with strongly developed alternate bars of considerable height the assumption of an evenly distributed shear stress over the bed is insufficient; the variation of the shear stress must be introduced, for instance, as a variation of the water depth. (Knapp-USGS)
W74-03788

REGIME PROBLEMS OF RIVERS FORMED IN SEDIMENT,
Alberta Univ., Edmonton.
T. Blench.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 5, p 5-1--5-33, 1973. 9 fig, 32 ref.

Descriptors: *Alluvial channels, *Channel morphology, *Sediment transport, Sedimentation, Regime, Profiles, Hydraulics, Open channel flow, Sedimentology, Bed load, Suspended load, Sedimentary structures.

Quantitative relations may be calculated in rivers, canals, and laboratory flumes where, starting from an imagined arbitrary state, the imposition of an average steady flow of water and sediment has resulted in the development of an average steady channel whose boundary has formed itself, at least partially, from the sediment in the flow. Graphs and formulas obtained from observations provide a means for estimating quantitatively the changes that will develop in the breadth, depth, slope, and meander sizes of rivers after human interference with their regimes. (Knapp-USGS)
W74-03789

DISPERSION OF CONTAMINANTS ATTACHED TO SEDIMENT BED LOAD,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-03797

BEHAVIOR OF COHESIVE MATERIAL FROM A SOIL ENGINEER'S VIEWPOINT,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
F. D. Nielson.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 14, p14-1--14-28, 1973. 22 fig, 1 tab, 16 ref.

Descriptors: *Soil erosion, *Cohesive soils, *Erosion, *Clay minerals, Water chemistry, Pore water, Cohesion, Ion exchange, Soil physical properties, Soil chemical properties.

The erosive characteristics of cohesive soils are controlled by electrical surface phenomena while granular soil is controlled by gravity forces. Electrical surface charge on the clay particle has a major effect on the performance of the cohesive soil mass. Cations in the pore fluid also have a significant effect on the erosive characteristic of the soil. In general, the nature of erosion resistance in cohesive soil is much more complex than in granular soils. These variables must be included in any research on cohesive soil: soil type, soil fabric, cation exchange capacity, cation type and concentration in the pore fluid and as exchangable cations, temperature, pH, water content of the soil, organic matter in the soil, soil density (void ratio), shear strength, atterberg limits, and particle size. (Knapp-USGS)
W74-03798

UPSLOPE EROSION ANALYSIS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
W. H. Wischmeier.

In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 15, p 15-1--15-26, 1973. 6 fig, 3 tab, 26 ref.

Descriptors: *Erosion, *Soil erosion, Equations, *Sediment yield, Slopes, Rainfall-runoff relationships, Impact(Rainfall), Vegetation effects, Land management.
Identifiers: *Universal Soil-Loss equation.

The rate of erosion on a particular land area is determined by comlex interrelations of many factors. These include factors that influence the erosive forces of rainfall and runoff and others that influence the resistance of the soil to detachment or transport by the erosive agents. The universal soil loss equation is a less refined but highly useful erosion model that was empirically derived from the upslope erosion data of the past 40 years. The equation computes sheet and rill erosion as a function of rainfall erosivity, soil erodibility, length and percent of slope, cropping and management, and supplemental conservation practices. For predictions of long-term average soil losses from specific upslope areas, its accuracy within the 37 states appears to be well within the needs for erosion control planning. Its application is limited to states and countries where information is available for local evaluations of the equation's individual factors. A relatively small amount of well designed local research should enable many countries to adapt the soil loss equation and basic relationships to their situations. (Knapp-USGS)
W74-03799

SUSPENDED-SEDIMENT SAMPLING VARIABILITY,
Geological Survey, Fort Collins, Colo.
J. P. Bennett, and C. F. Nordin.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 17, p 17-1--17-22, 1973. 9 fig, 1 tab, 9 ref.

Descriptors: *Suspended load, *Sampling, Variability, Statistics, Statistical methods, Channel morphology, Equations, *Sediment transport, Convection, Open channel flow.

A knowledge of the possible variations to be encountered in sampling is necessary for interpretation of any suspended sediment data. For most cases of practical interest, the standard deviation of the depth-integrated average concentration of suspended load in a particular vertical will not often be larger than 10% of the mean concentration in the vertical. This means that any properly collected depth-integrated sample in a particular vertical probably will well represent the mean suspended load through that vertical. The variation between various verticals in a cross section may be much larger than 100%, requiring that a number of verticals be sampled to obtain a good estimate of the total suspended load transported through a particular cross section. From 7 to 9 cross sections may have to be sampled to obtain a stable estimate of the total material being transported by a shallow sand-channel stream. (Knapp-USGS)
W74-03801

DISTRIBUTION OF ZR, TI, NI, CO, PB, CU, AND OTHER ELEMENTS IN THE SURFACE LAYER OF RECENT SEDIMENTS OF LAKE BALKHASH (RASPREDELENIYE ZR, TI, NI, CO, PB, CU I DRUGIHK ELEMENTOV V POVERKHNOSTNOM SLOYE SOVREMENNYKH OSA DKOV OZ. BALKHASH),
Adademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2H.
W74-03827

BASIC TYPES OF RECENT BOTTOM SEDIMENTS OF THE MEDITERRANEAN SEA, THEIR MINERALOGY AND GEOCHEMISTRY (OSNOVNYYE TIPY SOVREMENNYKH DONNYKH OSADKOV SREDIZEMNOGO MORYA, IKH MINERALOGIYA I GEOKHIMIYA),
Adademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
Ye. M. Yemel'yanov.
Litologiya i Poleznyye Iskopayemyye, No 1, p 29-46, January-February 1973. 4 fig, 3 tab, 31 ref.

Descriptors: *Bottom sediments, *Recent epoch, *Sedimentology, *Mineralogy, *Geochemistry, Sands, Silts, Clay minerals, Detritus, Inorganic compounds, Metals, Trace elements, Volcanoes, Maps.
Identifiers: USSR, *Mediterranean Sea, Oozes.

The composition and distribution of bottom sediments in the Mediterranean Sea are highly complex. The formation of individual sediment types is affected by factors which are clearly reflected in the granulometric, mineralogical, and chemical compositions of the deposits and in their physical properties. Terrigenous sediments occur in geosynclinal regions, around the mouth of the Nile River, and in the vicinity of Cyprus and Syria. Volcanoclastic deposits occur in the lagoon formed by the Santorin Volcano, in the Bay of Naples, and in the underwater part of the Stromboli volcanic cone. Volcanogenic iron-ore deposits have been found in the Santorin lagoon. Biogenic calcareous sediments are widespread in the Aegean Sea and Sea of Crete and in the arid zone of the eastern Mediterranean. Chemogenic oolitic sediments occur on the Egyptian and Tunisian shelf and manganese-bearing sands, on the peak of a submarine volcanic mountain in the Tyrrhenian Sea. Despite the presence of many active volcanoes, the volcanic factor plays a minor role in sedimentation. In distribution of sediment types and their composition, the Mediterranean Sea is a transitional basin between marine bodies of water and the ocean. Data are presented on mineralogy of sandy and silty fractions, absolute age of terrigenous-volcanogenic minerals and on distribution of CaC03, MgC03, amorphous Si02, organic C, Fe, Mn, Ti, P, Au, B, Ni, Co, Cr, U, Cu, Mo, Sr, and Ba in sediments. (Josefson-USGS)
W74-03828

RECENT SEDIMENTS OF THE PACIFIC OCEAN OFF THE COASTS OF PERU AND CHILE (SOVREMENNYYE OSADKI TIKHOGO OKEANA U BEREGOV PERU I CHILI),
Leningrad State Univ. (USSR).
N. V. Logvinenko, and Ye. A. Romankevich.
Litologiya i Poleznyye Iskopayemyye, No 1, p 3-16, January-February 1973. 4 fig, 2 tab, 12 ref.

Descriptors: *Sediments, *Bottom sediments, *Pacific Ocean, *Recent epoch, Sands, Silts, Clays, Clay minerals, Mineralogy, Detritus, Sediment distribution, Continental shelf, Continental slope, Coast, Maps.
Identifiers: USSR, *Peru, *Chile, Oozes.

General characteristics of recent sediments in the southeastern part of the Pacific Ocean and conditions of their formation are described. Recent sediments over the entire area of the ocean bottom are characterized by the constant presence of organogenic components: diatomaceous algae, radiolarians, sponge spicules, teeth and bones of vertebrates, foraminifera, and spores and pollens of land plants. Only mollusk shells are localized in the narrow area of the shallow-water shelf. Special attention is given to clastic components, sources of supply of clastic material, and its distribution in sediments. Three terrigenous-mineralogical provinces were identified: (1) the northern nearshore province located between the equator and approximately 8-10 deg South Latitude where quartz predominates over feldspars; (2) the southern nearshore province located between 8-10 and 30-32 deg South Latitude where feldspars predominate over quartz and kaolinite appears at its southern boundary; and (3) the ocean floor province located west of the deep-sea basin in the area of development of pelagic foraminiferal oozes and red deep-sea clay, where the influence of land is weaker and where volcanic material and various authigenic minerals occur in large amounts. Types of sediments in the southeastern part of the Pacific Ocean are tabulated. (Josefson-USGS)
W74-03829

A RECONNAISSANCE OF STREAMFLOW AND FLUVIAL SEDIMENT TRANSPORT, INCLINE VILLAGE AREA, LAKE TAHOE, NEVADA, SECOND PROGRESS REPORT 1971,
Geological Survey, Carson City, Nev.
P. A. Glancy.
Nevada Division of Water Resources, Carson City, Water Resources-Information Series Report 19, 1973. 37 p, 1 fig, 7 tab, 6 ref, append.

Descriptors: *Sediment transport, *Streamflow, *Lakes, *Nevada, Hydrologic data, Data collections, Sediment yield, Sediment load, Fluvial sediments, Particle size, Nutrients, Water quality, Flow rates, Rainfall, Snowmelt, Correlation analysis.
Identifiers: *Lake Tahoe(Nev), Incline Village area(Nev).

Runoff of the five major streams in the Incline Village area, Nevada, was about 17,600 acre-feet during the 1971 water year. About three-fourths of the runoff was from Incline and Third Creeks. Sediment transported to Lake Tahoe by the major streams was estimated to be about 11,000 tons, of which about 60% was from Incline and Third Creeks. About 90% of the sediment was delivered to the lake during the snowmelt runoff period. The annual sediment load was estimated to be about 78% sand and gravel, 13% silt, and 9% clay. Sediment transported by streams during periods of rainfall runoff generally contained greater percentages of silt and clay than that transported by snowmelt runoff. Estimated annual sediment yields ranged from 60 to 930 tons per square mile from undeveloped areas, and 620 to 7,600 tons per square mile from developed areas. The highest measured concentrations of nitrogen transported by streams to the lake during periods of heavy sediment transport were of dissolved ammonia and occurred during periods dominated by low-altitude runoff. (Woodard-USGS)
W74-04050

GELATIN COATED MICROSCOPE SLIDES IN SEDIMENTARY SIZE ANALYSIS,
Brock Univ., St. Catharines (Ontario). Dept. of Geological Sciences.
L. A. Perrie, and P. A. Peach.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1174-1175, December 1973.

Descriptors: *Particle size, *Microscopy, *Laboratory tests, *Analytical techniques, *Sedimentology, Sediments.
Identifiers: Microscope slides.

The use of gelatin-coated microscope slides for the support of clay sized particles prevents movement in the mounting medium leading to flocculation or clumping, which may affect the accuracy of particle size analysis with an image analyzing computer. Because of the hydroscopic properties of gelatin, the water is quickly absorbed leaving the grains stuck to the surface to which they become cemented, dispersed and almost immediately immobile. The method of dispersing the grains and applying them to the slides consists of taking about 0.10 gram of the material to be mounted, mixing it with distilled water in a microbeaker to which has been added a drop of 10% solution of sodium hexametaphosphate as a wetting agent and agitating

the mixture with an ultrasonic probe. A sample of the dispersed suspension is drawn off with a micropipette, transferred immediately to a dry gelatin-coated slide, and spread at once over the surface of the slide with the side of the pipette. This is the simplest way to obtain reasonable consistent dispersion of such materials as the finer grades of mine mill products, and of industrial chimney smoke and fly ash particles for evaluation of size distribution. (Knapp-USGS)
W74-04055

MEASURING VOLUMES OF SEDIMENTARY GRAINS,
Puerto Rico Univ., Mayaguez. Dept. of Geology.
M. T. Moussa.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1171-1173, December 1973. 3 ref.

Descriptors: *Specific gravity, *Density, *Volume, *Laboratory tests, Laboratory equipment, Analytical techniques, Instrumentation, Equipment, Sedimentology.
Identifiers: Laboratory balances.

To determine the volumes of individual sediment grains or fossils the hydrostatic weighing method based on Archimedes' principle is the simplest, and probably the most accurate method available. Any simple weighing instrument can be used without constructing special devices. The sediment grain or fossil is first used without constructing special devices. The sediment grain or fossil is first weighed in air. It is then placed on a small pan, loop, two-pronged hook or any suitable device and suspended by a very thin wire in a small container filled with distilled water (or other liquid of known density) and weighed while immersed completely in liquid. Several factors may affect the results of the hydrostatic weighing method especially if a high degree of accuracy is required. One factor is the variation of the specific gravity of any fluid with temperature; at normal atmospheric temperatures, however, the variation for water is so small that under normal laboratory conditions its effect can be safely neglected. The adherence of small air bubbles to the surface of a grain may become a serious source of error. Their prevention can be achieved by using a liquid of low surface tension (a liquid with a higher wetting power) as immersion medium or by adding a small amount of it to the water. Another source of error, especially when dealing with very small grains, is surface tension of the immersion liquid on the wire used for suspension. This effect will be negligible if air weighing is performed while the suspension device is immersed in fluid. (Knapp-USGS)
W74-04056

APPARATUS FOR STUDIES OF ARTIFICIAL SEDIMENTS,
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia). Baas-Becking Geobiological Lab.
B. Bubela, and J. Ferguson.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1167-1170, December 1973. 3 fig.

Descriptors: *Sedimentology, *Model studies, *Sampling, Oxidation-reduction potential, Hydrogen ion concentration, Hydrogen sulfide, Oxygen, Core drilling.

An apparatus for studies of artificial sediments is equipped with a coring rig that includes a novel design of self closing valve for vertical coring of unconsolidated sediments, and a divice for horizontal sampling for microanalysis. Eh, pH, H2S, and 02 are measured by microelectrodes inserted directly into the microsampler. The apparatus, originally designed to study a simulated sedimentary system, can be used for a variety of sedimentological studies. (Knapp-USGS)
W74-04057

LOGNORMAL SIZE DISTRIBUTION OF PARTICULATE MATTER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
K. Mahmood.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1161-1166, December 1973. 4 fig, 8 ref.

Descriptors: *Particle size, *Distribution patterns, *Statistical methods, *Probability, Statistics, *Sedimentology, Simulation analysis, Sediment transport.
Identifiers: Lognormal distributions.

Communication, analysis and interpretation of size distribution data for particulate matter are greatly simplified if observed size distributions can be represented by known probability density functions. Lognormal size distribution is often found applicable to particulate matter in nature and in industrial processes. In preactice, many advantages accrue when lognormal distribution is applicable. Processes involving 'proportionate effect' yield lognormal size distributions. Numerical experiments show that alluvial transport of sand-size bed material also results in lognormal size distribution even though the starting bed material has a uniform or gaussian distribution. (Knapp-USGS)
W74-04058

DETERMINATION OF ORGANIC CARBON IN MODERN CARBONATE SEDIMENTS,
Geological Survey, Denver, Colo. Office of Energy Resources.
A. A. Roberts, J. G. Palacas, and I. C. Frost.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1157-1159, December 1973. 2 tab, 17 ref.

Descriptors: *Organic matter, *Carbon, *Carbonates, *Chemical analysis, *Analytical techniques, Carbonate rocks, Bottom sediments.
Identifiers: Organic carbon.

In the routine analysis for organic carbon in modern unconsolidated sediments the initial step commonly is to remove the carbonate carbon by acid treatment and to analyze directly the organic carbon in the residue. As much as 44% of the organic carbon is modern carbonate sediments from Florida Bay, Florida, is solubilized and lost during the acid treatment. Therefore, the amount of carbon in the acid solution in these, and in similar modern sediments, must also be included in the analysis for an accurate determination of the percentage of total organic carbon in the sample. (Knapp-USGS)
W74-04059

ENVIRONMENTAL DETERMINATION USING HYDRAULIC EQUIVALENCE STUDIES,
Susquehanna Univ., Selinsgrove, Pa. Dept. of Geological Sciences.
R. H. Lowright.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1143-1147, December 1973. 4 fig, 10 ref.

Descriptors: *Beaches, *Dunes, *Suspended load, *Bed load, *Sampling, Particle size, Hydraulic similitude, *Settling velocity, Sedimentary structures, Stratigraphy, Sedimentology.
Identifiers: *Hydraulic equivalence.

It is possible to distinguish between beach and dune deposits and to differentiate between suspension and traction load deposits in streams on the basis of light and heavy mineral settling velocity distributions. Settling velocity distributions in beaches and dunes were compared with those for sands from the shallow nearshore zone. Data from shallow nearshore samples overlap that from samples from all the other environments. Therefore, environmental discrimination on the basis of a single sample is not possible using this method. However, if several samples collected from the same stratigraphic unit throughout a large area were analyzed, it should be possible to determine the environment of deposition of the sands. (Knapp-USGS)
W74-04060

INTERNAL GEOMETRY AND ORIGIN OF VEGETATED COASTAL SAND DUNES,
Virginia Inst. of Marine Science, Gloucester Point.
V. Goldsmith.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1128-1142, December 1973. 15 fig, 1 tab, 20 ref. DACW Contract 82-67-C-0004.

Descriptors: *Dunes, *Sedimentary structures, *Sedimentation, *Winds, *Massachusetts, Dune sands, Stratification, Vegetation effects, Sediment transport, Deposition(Sediments).
Identifiers: *Monomoy Island(Mass).

Frequency distributions of dip angles, azimuths, and elevations of 209 eolian cross-bed sets from Monomoy Island, Cape Cod, Massachusetts, were analyzed and compared with similar data from the coastal sand dunes of Mustang Island, Texas; Sapelo Island, Georgia; Praia de Leste, Brazil; and Israel. These analyses from five widely scattered localities show that vegetated coastal sand dunes have a distinctive internal dune geometry. At all five locations, azimuth distributions correlate with the prevailing winds, whether directly or with a bimodal azimuth distribution bisected by the prevailing wind vectors. Also, the dip distributions center at two modes, 11 deg-15 deg and 25 deg-35 deg. It is suggested that the high-angle dips form as pyramidal wind shadow dunes via slip-face accretion behind large vegetation hummocks, which results in the distinct bimodal azimuth distribution. On Monomoy, the combined azimuths show a statistically significant correlation with three prevailing northwest, southwest, and southeast wind directions rather than with the dominant northeast storm winds. This association is valid for crossbed sets at any dune elevation. The Monomoy dune geometry is closely dependent on growth of dune vegetation, especially Marram grass. The grasses act as baffles, trapping sand moved by the prevailing winds, which results in low-angle crossbed sets formed by the vertical accumulation of sand behind vegetation hummocks on the gently undulatory, nearly horizontal upper surface of the dunes. Thus, vegetation plays a distinctive role in the formation and internal geometry of vegetated coastal sand dunes. (Knapp-USGS)
W74-04061

PSEUDO-CROSSLAMINATION FORMED BY CLIMBING ADHESION RIPPLES,
Geological Survey, Corpus Christi, Tex.
R. E. Hunter.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1125-1127, December 1973. 3 fig, 9 ref.

Descriptors: *Ripple marks, *Dunes, *Sediment transport, *Saltation, Wind erosion, Deposition(Sediments), Dune sands, Sedimentary structures.

Adhesion ripples, which are formed when saltating dry sand adheres to a wet sand surface, migrate upwind during deposition of the sand. The internal structure of climbing adhesion ripples resembles crosslamination, because stratification defining successive positions of the depositional surface is typically absent or very poorly defined. Deposits formed by these ripples are likely to be preserved, and, if well exposed, this structure may be distinguishable from crosslamination. (Knapp-USGS)
W74-04062

FLUME EXPERIMENTS ON THE TRANSITION FROM RIPPLES TO LOWER FLAT BED WITH INCREASING SAND SIZE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Earth and Planetary Sciences.
J. B. Southard, and L. A. Boguchwal.

Journal of Sedimentary Petrology, Vol 43, No 4, p 1114-1121, December 1973. 5 fig, 1 tab, 14 ref. ONR Contract N00014-67-A-0204-0048.

Descriptors: *Sediment transport, *Bed load, *Hydraulic models, Currents(Water), Regime, *Flumes, Particle size, Velocity, Ripple marks, Sand waves, Sedimentary structures.

Observations were made in a small flume with three sizes of very well sorted quartz sand at constant mean flow depth to study in detail the relationship between ripples in finer sands and the lower-flat-bed mode of transport at similar velocities in coarser sands. A graph of mean flow velocity vs. sediment size for a flow depth of 7 cm plotted from the flume runs shows that in the size interval from 0.6 mm to 0.7 mm the lower flow velocities and dunes at higher flow velocities, so that the sequence of bed configurations in these sizes is more complicated than for either finer or coarser sands. The ripple field pinches out with increasing size at about 0.7 mm. There is a triple point involving ripples, dunes, and lower flat bed at about 0.6 mm. (Knapp-USGS)
W74-04063

AN OCCURRENCE OF 'BRICK PATTERN' OSCILLATORY RIPPLE MARKS AT MONO LAKE, CALIFORNIA,
Oregon State Univ., Corvallis. School of Oceanography.
P. D. Komar.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1111-1113, December 1973. 3 fig, 5 ref.
Identifiers: Mono Lake(Calif).

An occurrence of 'brick pattern' oscillatory ripple marks, with ridges spanning the ripple troughs forming a system of stripes at right angles to the ripple crests, was found at Mono Lake, California. This pattern was compared with that obtained in laboratory experiments by Bagnold (Prac. Royal Soc. London, ser A, Vol 187 p 1-15, 1946). In lake environments the ripple length is about a factor 0.8 of the near-bottom orbital motion under the waves. Using this factor, the orbital diameter must have been about 7.8 cm. Observations of waves on the lake on numerous occasions always gave wave periods close to 1.0 second. At this period the maximum near-bottom orbital velocity would have been 24.5 cm/sec, more than enouth to move the sands and cause rippling. At the 28-cm depth, a wave height of 13.3 cm would have been required to yield the 7.8 cm orbital diameter for a wave period of 1.0 second. Such a wave height is quite reasonable for Mono Lake and would yield a stable wave. Brick pattern ripples occur when the orbital diameter is reduced to about one-third of the ripple length. The water vortices must break up into separate or nearly separate pieces. A bridge develops where the separate vortices join. At Mono Lake, these must have been generated as the storm subsided and the wave heights decreased to about 4 cm. (Knapp-USGS)
W74-04064

THE THRESHOLD OF SEDIMENT MOVEMENT UNDER OSCILLATORY WATER WAVES,
Oregon State Univ., Corvallis. School of Oceanography.
P. D. Komar, and M. C. Miller.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1101-1110, December 1973. 7 fig, 1 tab, 13 ref. NSF Grant GA-36817.

Descriptors: *Erosion, *Bottom sediments, *Waves(Water), *Sediment transport, Current(Water), Suspended load, Bed load, Turbulent flow, Laminar flow, Unsteady flow, Surf.

As the velocity of the to-and-fro water motion near the bottom under oscillatory waves is increased, a stage is reached when the water exerts a stress on the particles sufficient to cause them to move. For grain diameters less than about 0.05 cm (medium sands and finer) the threshold is reached while the flow in the boundary layer is still laminar. This is described by a relationship modified after an empirical equation deduced by Bagnold, but which also has a theoretical basis. For grain diameters greater than 0.05 cm (coarse sands and coarser) the threshold occurs after the boundary layer has become turbulent and is best predicted with an empirical curve related to the wave period. This involves a dimensionless number which represents the ratio of the acceleration forces to the effective gravity force acting on the grains. (Knapp-USGS)
W74-04065

MUCILAGINOUS MATRIX OF SOME ESTUARINE SANDS IN CONNECTICUT,
Connecticut Univ., Storrs. Dept. of Geology and Geography.
For primary bibliographic entry see Field 2L.
W74-04066

SILCRETES AND ASSOCIATED SILICA DIAGENESIS IN SOUTHERN AFRICA AND AUSTRALIA,
Department of Mines, Wellington (New Zealand).
D. Smale.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1077-1089, December 1973. 8 fig, 39 ref.

Descriptors: *Diagenesis, *Silica, *Chemical precipitation, Quartz, Groundwater movement, Silicates, *Africa, *Australia.
Identifiers: Silcretes.

Five types of silcrete are recognized in Australia and Southern Africa: terrazzo, conglomeratic, Albertinia, opaline and fine-grained massive, and quartzitic. Of these the terrazzo is the primary and most abundant form. The conglomerate and Albertinia types are derivatives of it, but the others are distinct and much rarer. The terrazzo variety is mostly pale buff or yellowish grey, but may also be green or purplish brown. It consists of a framework of angular to subrounded quartz grains, some showing effects of solution, set in a matrix of amorphous, cherty or opaline silica containing abundant leucoxene. The conglomeratic type consists of brecciated terrazzo in a silcrete matrix. In the Albertinia type quartz detritus is almost absent. The rarer forms are mostly pure common opal or chalcedony, either massive or porous. The quartzitic type is the response of a sedimentary orthoquartzite to the silcrete-forming process. On Spilsby Island, South Australia, silica-rich solutions rising to meet downward percolating solutions with NaCl, Na2SO4, Fe203 or MgO or of lower pH cause the silica deposition. Other widespread occurrences may have formed by accumulation through evapotranspiration. The quartzitic type forms by authigenic overgrowths in detrital quartz grains. (Knapp-USGS)
W74-04067

SUPRATIDAL ENVIRONMENT AND GEOCHEMISTRY OF SOME RECENT DOLOMITE CONCRETIONS, BROAD SOUND, QUEENSLAND, AUSTRALIA,
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
For primary bibliographic entry see Field 2L.
W74-04069

DETERMINATION OF FALLOUT CS-137 AND NATURALLY OCCURRING GAMMA-RAY EMITTERS IN SEDIMENTS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 5B.
W74-04190

EVALUATION OF GROUNDWATER RESOURCES IN LIVERMORE VALLEY, CALIFORNIA,
California Univ., Berkeley. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W74-04201

MEASUREMENTS OF BEACH PROCESS VARIABLES, OUTER BANKS, NORTH CAROLINA,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
R. Dolan, J. C. Ferm, and D. S. McArthur.
Available from NTIS as AD-686 681, for $6.00 paper copy, $1.45 microfiche. Technical Report No. 64, prepared for Office of Naval Research, Geography Branch, January 1969. 79 p, 7 fig, 2 tab, 10 ref, 10 append, 7 photos. Nonr-1575(03).

Descriptors: Beaches, Sediments, *Waves(Water), Water levels, Littoral, *Ocean currents, *Beach erosion, Coasts, Shallow water, *North Carolina, *Barrier islands.
Identifiers: Bottom configuration, Surf zone, Littoral currents, Wave characteristics, Outer Banks(NC), Bodie Island(NC).

A series of beach-process experiments was conducted on Bodie Island, North Carolina, during 1963-1964. Included were essentially continuous and simultaneous measurements of subaerial-beach and inshore-bottom configuration, sediment characteristics, wave and swash properties, still-water levels, and currents. Methods of measurement are summarized and the observations made during the 6-month period are presented. (Sinha-OEIS)
W74-04205

GEOMETRY AND DEVELOPMENT OF SPIT-BAR SHORELINES AT HORSESHOE COVE, SANDY HOOK, NEW JERSEY,
Columbia Univ., New York. Dept. of Geology.
For primary bibliographic entry see Field 2L.
W74-04206

STORMS CAUSING HARBOR AND SHORELINE DAMAGE THROUGH WIND AND WAVES NEAR MONTEREY, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
H. L. Bixby, Jr.
Available from NTIS as AD-619 505, for $6.00 paper copy, $1.45 microfiche. MS thesis, 1962. 179 p, 85 fig, 4 tab, 16 ref, 5 append.

Descriptors: *California, *Storms, *Harbors, *Weather forecasting, *Meteorological data, Flooding, *Waves(Water), Damages, Winds, Shores, Synoptic analysis, Beach erosion.
Identifiers: *Windstorms, Monterey(CA), Seas, Swell.

To gain information that might lead to forecasting techniques, a complete list of storms for the 50-year period from 1910 to 1960 was made through a search of local newspaper files. The most significant storms, their frequency of occurrence, the synoptic situations with which they were associated, and the hindcasted sea condition that accompanied them are described. Two general types of damaging storms were found to exist: one occurring offshore in the open ocean and causing shoreline erosion and flooding by the action of sea and swell; the other, a local windstorm sweeping across Monterey Bay and causing damage to vessels in the harbor mainly by the combined effects of strong gusty winds and short-period seas generated in the bay. Wave hindcasts were made to facilitate comparisons of storm intensities within each of the two types of storms. These comparisons, in terms of the intensity of wave conditions, were made using a quantity called Damage Potential, a function of the size and duration of the storm waves. Synoptic situations with

which these storms were associated were classified by a weather-typing system. All storms were found to be associated with one of three principal types. The possibility of an objective-type forecasting technique for the wind-storms is discussed. (Sinha-OEIS)
W74-04208

MODERN SEDIMENTS OF WILLAPA BAY, WASHINGTON: A COASTAL PLAIN ESTUARY,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W74-04209

ON WIND TIDES AND LONGSHORE CURRENTS OVER THE CONTINENTAL SHELF DUE TO WINDS BLOWING AT AN ANGLE TO THE COAST,
National Engineering Science Co., Pasadena, Calif.
For primary bibliographic entry see Field 2E.
W74-04210

AN INVESTIGATION OF BOTTOM CHANGES IN MONTEREY HARBOR (1932-1969),
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2L.
W74-04211

THE EFFECTS OF WIND AND PRECIPITATION ON THE MODIFICATION OF SOUTH BEACH, CRESCENT CITY, CALIFORNIA INCLUDING AN APPENDIX ON THE FOCUSING OF TSUNAMI ENERGY AT CRESCENT CITY,
Atmospheric Research Group, Altadena, Calif.
For primary bibliographic entry see Field 2E.
W74-04212

TIME DEPENDENT SHEAR STRESS BENEATH A SHOALING WAVE,
Naval Academy, Annapolis, Md.
J. Fisher.
Available from NTIS as AD-749 709 for $3.00 paper copy, $1.45 microfiche. Trident Scholar Project Report No 26, May 19, 1972. 102 p, 45 fig, 25 ref, 3 append.

Descriptors: *Waves(Water), *Shear stress, *Beaches, *Coasts, *Shoals.
Identifiers: Shoaling, Incident wave, Particle velocity.

The celerity of a shoaling wave was measured and plotted as a function of the parameter d/L(o) and compared to linear wave theory. A noticeably higher celerity was measured in the free stream than was measured by hot film shear sensors in the boundary layer. Hot film shear sensors were also used to determine the phase relationship between shear stress and free stream particle velocity. Data results indicate that the maximum shear stress in an oscillatory flow field leads the maximum particle velocity by approximately 30 degrees - 35 degrees and that this has increased with distance from the bottom. The phase difference was also found to be dependent upon the length of the incident wave. It is hypothesized that the boundary layer growth and particle velocity increase in an alternately accelerating and decelerating flow field are related such that the maximum velocity gradient du/dy will occur approximately 30 degrees prior to the maximum particle velocity. (Sinha-OEIS)
W74-04213

MONTEREY BAY BIBLIOGRAPHY.
Moss Landing Marine Labs., Calif.
For primary bibliographic entry see Field 2L.
W74-04218

MONTEREY BAY BIBLIOGRAPHY. SUPPLEMENT NUMBER ONE.
Moss Landing Marine Labs., Calif.
For primary bibliographic entry see Field 2L.
W74-04219

BUDGET OF LITTORAL SANDS IN THE VICINITY OF POINT ARGUELLO, CALIFORNIA,
Army Coastal Engineering Research Center, Washington, D.C.
A. J. Bowen, and D. L. Inman.
Available from NTIS as $6.00 paper copy, $1.45 microfiche. Technical Memorandum No 19, December 1966. 41 p, 15 fig, 7 tab, 31 ref.

Descriptors: *California, *Sediment transport, *Littoral, *Coastal engineering, Coasts, Shallow water, Climate, Beaches, *Wind erosion, Rivers.
Identifiers: Point Arguello(CA), *Longshore transport, Nearshore, Wave characteristics.

Results are presented of a detailed analysis of the various littoral processes which affect the California Coast between Pismo Beach and Santa Barbara. The method involves the concept of a sand budget based on the transport rates of all significant littoral processes. Each process is examined to assess the sedimentary contributions (credits) and losses (debits). To balance the sediment transports, the region is sub-divided into five cells, the boundaries of which are chosen at positions where the longshore transport of sand has been estimated. Using basic data from maps, surveys, aerial photographs, climatic records, and wave conditions, a quantitative transport rate has been determined for each process in each cell. The results are shown in graphic and tabular form. The budget concept provides a practical tool for coastal engineering problems. However, the difficulty of moving from qualitative trends to quantitative determinations reveals gaps in the present state of knowledge and requirements for further research. (Sinha-OEIS)
W74-04221

INVESTIGATION OF THE VELOCITY STRUCTURE IN THE BOTTOM REGION OF A TURBULENT WAVE FLOW,
For primary bibliographic entry see Field 8B.
W74-04250

ON THE EXTENT OF BOTTOM EROSION IN LARGE RIVERS (UEBER DEN UMFANG DER SCHLENEROSION IN GROSSEN GEWAESSERN),
Bundesanstalt fuer Gewaesserkunde, Coblenz (West Germany).
M. Tippner.
Deutsche Gewaesserkundliche Mitteilungen, Vol 17, No 5, p 125-130, October 1973. 4 fig, 7 tab, 24 ref.

Descriptors: *Erosion, *Channel erosion, *Stream erosion, *Degradation(Stream), *River beds, Streambeds, Bottom sediments, Bed load, Sediment transport, Erosion rates, Dams, Water levels.
Identifiers: *Germany, Rhine River, Elbe River, Danube River.

As a result of tributary regulation, large rivers such as the Rhine, Elbe, and Danube have been cut off, to a considerable extent, from their original bedload supply sources. The material required for bedload transport can, therefore, be taken only from the river's own bed, which leads to continuous degradation of the riverbed and to retrogression of the water level. Normalization and regulation measures, as well as removal of bottom material in the course of dredging operations may also contribute to continuous degradation of the channel. Erosion rates of the Elbe, Rhine, and Danube are of the order of 0.3 to 3 cm per year. Greatest erosion depths are observed at the Lower Rhine and are due to bedload washout, dredging, and lowering of the bottom as a result of mining activities. Riverbed degradation is particularly pronounced on the downstream side of dams, especially during the first years following completion of the dam. During the initial stage of erosion, the channel may be degraded at a rate of up to 2 m per year. Mean values obtained from observation periods extending over several years differ considerably and fall between 20 cm and 50 cm per year. The large differences result from the varying lengths of the observation periods and from the different characteristics of the bed material in the various erosion zones. Main causes of bottom erosion in rivers such as the Rhine are shown schematically, and erosion on the downstream side of two North American dams and of various dams in the Federal Republic of Germany is tabulated. (Josefson-USGS)
W74-04252

COAGULATION IN ESTUARIES,
North Carolina Univ. Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5B.
W74-04257

ERGS,
Ife Univ. (Nigeria). Dept. of Geology.
I. G. Wilson.
Sedimentary Geology, Vol 10, No 2, p 77-106, October 1973. 21 fig, 2 tab, 37 ref.

Descriptors: *Sands, *Dunes, *Aeolian soils, *Sediment transport, Particle size, Dune sands, Winds, Wind erosion, Sedimentary structures, Deserts.

Ergs (areas of aeolian sand deposits) have bed forms with a 3-order hierarchy of ripples, dunes and draas (large sandy bed forms). Ergs may occur in any relatively vegetation-free area with an adequate sand supply. The virtual absence of ergs from highland areas is attributed largely to acceleration and divergence of the winds which makes the sandflow undersaturated. Ergs with thick sand deposits and draa development in the Sahara, Arabia and Asia are contrasted with thinner dune ergs in Australia which lack draa development. Sand thickness, proportion of sand cover, bed-form height, spacing and orientation vary in a significant way with position within the Algerian ergs. This may partly be due to regional variations in the wind regime but more probably to regional grain-size variations which, because they determine the threshold velocity of sand movement, control the effective wind regime in an area. Grain-size variations can be interpreted from aerial photographs to a large extent because of their effect on the size and shape of the bed form. In the northern Algerian ergs, regional patterns of sandflow may vary according to the grain size and there is no simple relation between wind directions and the draa trends in any area. (Knapp-USGS)
W74-04264

SEDIMENT PRODUCTION IN A SMALL APPALACHIAN WATERSHED DURING SPRING RUNOFF: THE EATON BASIN, 1970-1972,
McGill Univ., Montreal (Quebec). Dept. of Geography.
M. A. Carson, C. H. Taylor, and B. J. Grey.
Canadian Journal of Earth Sciences, Vol 10, No 12, p 1707-1734, December 1973. 17 fig, 2 tab, 42 ref.

Descriptors: *Sediment yield, *Erosion, Scour, Stream erosion, *Small watersheds, *Canada, Sediment load, Mathematical models, Simulation analysis.
Identifiers: Eaton Basin(Quebec).

Sediment yield was measured in an IHD representative basin, the Eaton River basin (86 sq km in

area), in the Quebec Applachians. The basin is dominantly forest covered, contains no large settlement, and shows little human disturbance that might affect sediment production. The suspended load of the Eaton River was studied in detail during the spring runoff periods of 1970 and 1971. Sediment transport rates are well below capacity and sediment yields are lower than might have been expected from data in the United States. Suspended sediment originates primarily from scour of the banks of the channel network. Sediment concentrations show a systematic increase with basin area (or distance downstream), unlike previous data from the midwestern United States. The sediment rating curve approach is a very good predictor of sediment transport rates. The difference in loads between 1970 and 1971 floods and residuals from the sediment rating curves are considered in a simulation model of sediment production from bank erosion based on the changing shear resistance of bank sediment during a fluctuating hydrograph. (Knapp-USGS)
W74-04267

THE SIGNIFICANCE OF ION EXCHANGE TO INTERSTITIAL SOLUTIONS IN CLAYEY SEDIMENTS,
Geological Survey of South Australia, Adelaide.
For primary bibliographic entry see Field 2K.
W74-04268

SOME ASPECTS OF THE CA AND SR WEATHERING CYCLE IN THE LAKE KINNERET (LAKE TIBERIAS) DRAINAGE BASIN,
Hebrew Univ., Rehovoth (Israel). Dept. of Soil and Water Science.
A. Singer, and J. Navrot.
Chemical Geology, Vol 12, No 3, p 209-218, November 1973. 1 fig, 3 tab, 24 ref.

Descriptors: *Weathering, *Water chemistry, *Clay minerals, Basalts, Lakes, Carbonates, Bottom sediemtns, *Calcium, *Strontium, Leaching, Bicarbonates.
Identifiers: *Israel(Lake Kinneret).

Sr/Ca ratios in the clay weathering products of basalt rocks from the Lake Kinneret drainage basin in Israel are very similar to the ratios in the rocks, indicating similar depletion intensities for the two elements. In the clays from the scoriae and some lapilli tuffs the ratios were somewhat higher than in the corresponding rocks, indicating preferential retention of strontium in the clays. The ratio in drainage water from these areas was much lower than that obtained by mass balance calculations. The Sr/Ca ratio in Jordan river water draining primarily limestone areas is 0.0023. Very high Sr/Ca ratios in Lake Kinneret water were attributed to the influence of saline sublacustrine springs. The carbonate fraction from recent lake sediments has the Sr/Ca ratios characteristic for calcite precipitated biogenically in marine environments. The relative strontium enrichment of the lake water may be explained by the intensive precipitation of carbonates with low strontium distribution coefficients. (Knapp-USGS)
W74-04269

ASSESSMENT OF COASTAL CHANGES WITH THE AID OF PHOTOGRAMMETRIC AND COMPUTER-AIDED TECHNIQUES,
University Coll. of Wales, Aberystwyth. Dept. of Geography.
For primary bibliographic entry see Field 7B.
W74-04271

EXPERIENCES WITH THE CORRECTION OF DISORDERED STREAMS OF THE ALPINE TYPE, (IN ITALIAN),
For primary bibliographic entry see Field 4D.
W74-04276

2K. Chemical Processes

EFFECT OF POLYESTER FIBER PROCESSING EFFLUENTS ON WATER QUALITY,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 5A.
W74-03761

THE INTERACTION OF WATER WITH ORGANIC SOLUTE SPECIES,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 1B.
W74-03762

CATION ADSORPTION AND DESORPTION RATES IN NATURAL WATER STUDIES,
Montana State Univ., Bozeman. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-03765

THE CHEMISTRY OF CADMIUM IN NATURAL WATER--I: A STUDY OF CADMIUM COMPLEX FORMATION USING THE CADMIUM SPECIFIC-ION ELECTRODE,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5B.
W74-03775

WATER RESOURCES OF THE NEW JERSEY PART OF THE RAMAPO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-03806

WATER-LEVEL DECLINES AND GROUNDWATER QUALITY, UPPER BLACK SQUIRREL CREEK BASIN, COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W74-03808

WATER RESOURCES OF THE NORTHERN CHEYENNE INDIAN RESERVATION AND ADJACENT AREA, SOUTHEASTERN MONTANA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-03809

WATER AVAILABILITY AND GEOLOGY IN MARION COUNTY, ALABAMA,
Geological Survey of Alabama, University.
For primary bibliographic entry see Field 4B.
W74-03810

WATER AVAILABILITY IN MOBILE COUNTY, ALABAMA,
Geological Survey of Alabama, University.
For primary bibliographic entry see Field 4B.
W74-03811

SELENIUM IN NEBRASKA'S GROUNDWATER AND STREAMS,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 5B.
W74-03813

GROUNDWATER DATA IN SANTA BARBARA AND SOUTHERN SAN LUIS OBISPO COUNTIES, CALIFORNIA, SPRING 1970 TO SPRING 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W74-03814

CHEMICAL QUALITY OF SURFACE WATER IN THE EASTERN OSWEGO RIVER BASIN, NEW YORK,
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 5A.
W74-03817

BOREHOLE RECHARGE: THE COMPATABILITY OF RECHARGE WATER WITH THE AQUIFER,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W74-03822

BASIC TYPES OF RECENT BOTTOM SEDIMENTS OF THE MEDITERRANEAN SEA, THEIR MINERALOGY AND GEOCHEMISTRY (OSNOVNYYE TIPY SOVREMENNYKH DONNYKH OSADKOV SREDIZEMNOGO MORYA, IKH MINERALOGIYA I GEOKHIMIYA),
Adademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-03828

STABILITY OF DILUTE STANDARD SOLUTIONS OF ANTIMONY, ARSENIC, IRON AND RHENIUM USED IN COLORIMETRY,
Loughborough Univ. of Technology (England). Dept. of Chemistry.
A. A. Al-Sibaai, and A. G. Fogg.
Analyst, Vol 98, No 1171, p 732-738, October 1973. 8 tab, 11 ref.

Descriptors: *Stability, *Colorimetry, Storage, *Iron, Heavy metals, Aqueous solutions, Light.
Identifiers: Standard solutions, *Antimony, *Arsenic, *Rhenium.

The stability of dilute standard solutions of Sb (4 micrograms/ml), As (20 micrograms/ml), Fe (50 micrograms/ml), and Re (5 micrograms/ml) used in colorimetry was studied by colorimetric procedures over a period of two months. The solutions were stored in soda-glass, borosilicate glass, and rigid polyethylene containers. The dilute standard antimony solutions, prepared either by dissolving antimony potassium tartrate in water, or by dissolving elemental antimony in sulphuric acid and diluting the solution with water, were found to be stable (i.e., to deteriorate by less than 3 percent) over a period of 50 days. Antimony solutions containing hydrochloric acid deteriorated rapidly, however. The dilute standard arsenic solutions prepared either by dissolving arsenic (III) oxide in sodium hydroxide solution and then neutralizing the solution with hydrochloric acid, or by dissolving disodium hydrogen arsenate heptahydrate in water, were found to be stable. Arsenic (III) in the former standard solution was oxidized slowly by dissolved oxygen, but the total arsenic present in the solution remained unchanged and could be determined by the molybdenum-blue method. An iron (III) standard solution, 0.06 M in hydrochloric acid and prepared from ammonium iron (III) sulphate, was stable for at least 2 months, as was a standard potassium perrhenate solution in a buffer solution of pH 6. Light in the laboratory and the material of the containers did not adversely affect the solutions reported to be stable. (Little-Battelle)
W74-03842

NITRATE DETERMINATION BY A MODIFIED CONWAY MICRODIFFUSION METHOD,
Agricultural Research Service, Beltsville, Md. Plant Physiology Inst.
For primary bibliographic entry see Field 2G.
W74-03845

DIFFERENTIAL ELECTROLYTIC POTENTIOMETRY WITH PERIODIC POLARISATION.

PART XXI. INTRODUCTION AND INSTRUMENTATION,
Exeter Univ. (England). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-03859

DIRECT DETERMINATION OF SULFIDE BY RAPID DIRECT CURRENT POLAROGRAPHY,
Melbourne Univ., Parkville (Australia). Dept. of Physical Chemistry.
D. R. Canterford.
Analytical Chemistry, Vol 45, No 14, p 2414-2417, December 1973. 3 fig, 2 tab, 16 ref.

Descriptors: *Sulfides, *Aqueous solutions, *Pollutant identification, Chemical analysis, *Polarographic analysis, Electrolytes, Hydrogen ion concentration, Anions, Iodides, Chlorides, Bromides.
Identifiers: DC Polarography, Detection limits, Buffers, Chemical interference, Cyanides, Hydroxyl ion, Bisulfites, Thiocyanates, Sensitivity, Limiting current.

The rapid polarographic method for the direct determination of sulfide ion in aqueous solution has been investigated in detail. As well as comparing the sensitivity of the conventional and rapid methods, the possibility of interference from other anions and the effect of pH of the supporting electrolyte have been studied. The detection limit under rapid polarographic conditions was 4 microM sulfide, compared with 3 microM under conventional conditions. Interference studies involved the recording of polarograms of 0.0015 M sulfide in the presence and absence of 0.01 M potentially interfering anion. The rapid technique overcomes the anticipated anionic interferences. Under both rapid and conventional conditions, the total limiting current is independent of pH, which is an advantage in analytical applications as it eliminates the need to buffer the supporting electrolyte prior to analysis. Supporting electrolytes of pH less than 8 or 9 are not recommended because of the possiblity of loss of sulfide as hydrogen sulfide. (Holoman-Battelle)
W74-03865

A LIQUID ION-EXCHANGE NITRATE-SELECTIVE ELECTRODE BASED ON CARBON PASTE,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W74-03884

WATER SAMPLING AND LABORATORY SERVICE,
Bridgeport Hydraulic Co., Conn.
For primary bibliographic entry see Field 5A.
W74-04024

A BRIEF WATER-RESOURCES APPRAISAL OF THE TRUCKEE RIVER BASIN, WESTERN NEVADA,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 4A.
W74-04047

LOSS OF MERCURY FROM WATER DURING STORAGE,
Environmental Health Lab., McClellan AFB, Calif.
For primary bibliographic entry see Field 5A.
W74-04048

HYDROGEOLOGY OF THE PRINCIPAL AQUIFERS IN SULLIVAN AND GREENE COUNTIES, INDIANA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 2F.
W74-04049

FIELD WATER-QUALITY INFORMATION ALONG THE PROPOSED TRANS-ALASKA PIPELINE CORRIDOR, SEPTEMBER 1970 THROUGH SEPTEMBER 1972,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 5A.
W74-04054

SILCRETES AND ASSOCIATED SILICA DIAGENESIS IN SOUTHERN AFRICA AND AUSTRALIA,
Department of Mines, Wellington (New Zealand).
For primary bibliographic entry see Field 2J.
W74-04067

PHREATIC VS. VADOSE DIAGENESIS: STRATIGRAPHY AND MINERALOGY OF A CORED BOREHOLE ON BARBADOS, W. I.,
Brown Univ., Providence, R.I. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2F.
W74-04068

CONTROL AND DISTRIBUTION OF URANIUM IN CORAL REEFS DURING DIAGENESIS,
Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Geology.
G. Gvirtzman, G. M. Friedman, and D. S. Miller.
Journal of Sedimentary Petrology, Vol 43, No 4, p 985-997, December 1973. 12 fig, 5 tab, 21 ref. AEC Contract At(30-1)-3836.

Descriptors: *Coral, *Uranium radioisotopes, *Diagenesis, Calcium carbonate, *Reefs, Water chemistry, Mineralogy, *Calcite.
Identifiers: *Red Sea, Aragonite.

About 2 ppm of uranium was found in the aragonitic skeletons of modern scleractinian corals; this is a constant value, regardless of occurrence, anatomy, or taxonomy. The presence of cement of aragonite or high-magnesium calcite usually raises the concentration of bulk samples to about 3 ppm. Modern corals may contain up to 50% of cementing minerals. Organisms, such as corals and coralline algae, while secreting their skeleton, discriminate against the uptake of uranium, whereas the uptake of uranium by mineral cements is less restrained. Aragonite cement contains about 3.6 ppm and high-magnesium calcite cement, 2.6 ppm uranium. During leaching by freshwater, the aragonite of the skeletons of corals dissolves out. This creates hollow molds which fill with drusy low-magnesium calcite. In emergent reefs from the shores of the Red Sea which display the effects of progressive diagenesis, this calcite is enriched in uranium (3.9 ppm) beyond that found in marine cements. Second-generation calcite which fills original voids in the corals from the emergent reefs contains a lower level of uranium concentration (1.3 ppm). The level of concentration of uranium in low-magnesium calcite of diagenetically altered corals is a function of the availability of uranium in meteoric waters. In aragonite as well as in high- and low-magnesian calcite, uranium replaces calcium or occupies lattice vacancies in the crystal lattice. (Knapp-USGS)
W74-04070

ABSORPTIOMETRIC DETERMINATION OF TRACE AMOUNTS OF SULPHIDE ION IN WATER,
Mosul Univ. (Iraq). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-04072

APPLICATION OF THE CARBON CUP ATOMISATION TECHNIQUE IN WATER ANALYSIS BY ATOMIC-ABSORPTION SPECTROSCOPY,
Nuklearni Institut Jozef Stefan, Ljubljana (Yugoslavia).
For primary bibliographic entry see Field 5A.
W74-04073

THE INUNDATION REGION OF THE DANUBE, KM 1402,
G. Petrovic.
Arch Hydrobiol Suppl. Vol 44, No 1, p 24-33. 1972. Illus. English summary.
Identifiers: *Danube River, *Inundation, *Yugoslavia(Apatin), Hydrochemical studies.

Due to the digging of the Danube channel the inundation region near Apatin was fully isolated by a dam from the river Danube. The hydrochemical relations in the shallow basin (only 1-6 m in depth) differ completely from those of the Danube.--Copyright 1973, Biological Abstracts, Inc.
W74-04080

DETERMINING FORMATION WATER RESISTIVITY FROM CHEMICAL ANALYSIS.
Sinclair Oil and Gas Co., Tulsa, Okla.
E. J. Moore, S. E. Szasz, and B. F. Whitney.
Journal of Petroleum Technology, Vol 18, No 3, p 373-376, March, 1966. 4 fig, 3 tab, 4 ref.

Descriptors: *Resistivity, *Water analysis, Inorganic compounds, *Electrical well logging, Rock properties, Conductivity, Connate water, Porosity, Ionization, Solutes, Brines.
Identifiers: *Equivalent sodium chloride, *Cation correction factor, *Anion correction factor.

An accurate value of formation water resistivity is necessary in order to make reliable calculations of fluid saturation from electrical well logs. In the absence of a measured value of formation water resistivity, the resistivity can be found from the chemical analysis provided the concentrations of the various ions can be converted to equivalent concentrations of sodium and chloride ions. Conversion by the use of constant multipliers (methods of Dunlap and Hawthorne (1951)) may lead to large errors at high salt concentrations. Two new methods were developed which take into account not only other ions than sodium and chloride, but also the total dissolved salts. For solutions similar in composition to actual formation waters, these methods yield equivalent sodium chloride concentrations which are within plus or minus 5% of the value determined from the measured resistivity values. Reliable values for porosity and connate water are obtained at high salt concentrations. In the laboratory where both resistivity and chemical analysis determinations are made, the methods furnish a quick check on the consistency of the measurements. (Gray-NWWA)
W74-04145

STABILITY FIELD DIAGRAMS AS AIDS IN IRON CHEMISTRY STUDIES,
Geological Survey, Denver, Colo. Water Resources Div.
J. D. Hem.
Journal American Water Works Association, Vol 53, No 2, p 211-228, February, 1961. 6 fig, 13 ref.

Descriptors: Groundwater, *Chemical properties, *Oxidation-reduction potential, *Solubility, *Iron, Iron compounds, *Hydrogen ion concentration.
Identifiers: Stability field diagrams.

In many natural waters, the solubility of iron is controlled by the redox potential, pH, and concentrations of carbonate and sulfur anionic species. These factors can be summarized by means of stability field diagrams, which are graphs having redox potential as the ordinate and pH as the abscissa. In the absence of chemical complexing and excessive amounts of carbonate, the pH and iron content of a ground water may serve as an index of the redox potential of the water in its natural environment. The stability field diagrams summarize the conditions required for stability of solutions containing 0.01-100 ppm iron, and indicate some

factors that control solution and precipitation of iron in natural water. (Campbell-NWWA)
W74-04163

THE SIGNIFICANCE OF ION EXCHANGE TO INTERSTITIAL SOLUTIONS IN CLAYEY SEDIMENTS,
Geological Survey of South Australia, Adelaide.
S. B. Devine, R. E. Ferrel, Jr., and G. K. Billings.
Chemical Geology, Vol 12, No 3, p 219-228, November 1973. 3 fig, 22 ref. USGS Contract 14-08-0001-108077.

Descriptors: *Ion exchange, *Clays, *Bottom sediments, *Connate water, *Water chemistry, Clay minerals, Sea water, Chemical reactions, Mineralogy, Laboratory tests.

The ion population in interstitial solutions in clayey sediments is distributed by Donnan chemical potential forces between inner and outer (micellar and intermicellar, respectively) solutions around clay-mineral particles. Extraction procedures which involve a single dilution step disturb the ion distribution between inner and outer solutions. The relationship of solutions extracted by squeezing to Donnan equilibrium remains relatively untested. A method that may distinguish the ineer and outer solutions in the laboratory is suggested. It involves multiple dilution extractions from several aliquots of a single sediment sample. Each aliquot has a different sediment/water ratio, and the line of best fit to the ion activities of extracted solutions may be extrapolated to the in situ sediment/water ratio. Efforts to distinguish inner and outer solutions in marine clayey sediments ought to be made because their existence may have importance to the study of the chemical evolution of such sediments. (Knapp-USGS)
W74-04268

ON SALTWATER HOT SPRINGS IN THE COAST AREA OF WESTERN ANATOLIA, TURKEY (UBER SALZWASSER-THERMEN IM KUSTENLAND VON WEST-ANATOLIEN, TURKEI),
Aegean Univ., Bornova (Turkey).
For primary bibliographic entry see Field 2F.
W74-04270

THE INFLUENCE OF SUSPENDED PARTICLES ON THE PRECIPITATION OF IRON IN NATURAL WATERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-04272

SOME PHYSICAL AND CHEMICAL PROPERTIES OF THE GULF OF CORINTH,
Washington Univ. Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W74-04273

BASE OF FRESH GROUND WATER (APPROXIMATELY 3,000 MICROMHOS) IN THE SAN JOAQUIN VALLEY, CALIFORNIA),
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-04274

WATER RESOURCES OF WISCONSIN, ST. CROIX RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-04275

2L. Estuaries

CHANGES IN CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF A HEAVY RESIDUAL OIL WEATHERING UNDER NATURAL CONDITIONS,
Nova Scotia Technical Coll., Halifax.
For primary bibliographic entry see Field 5B.
W74-03877

ESTUARIES UNDER ATTACK,
Oregon State Univ. Extension Service, Corvallis. Marine Advisory Program.
For primary bibliographic entry see Field 6G.
W74-04033

MUCILAGINOUS MATRIX OF SOME ESTUARINE SANDS IN CONNECTICUT,
Connecticut Univ., Storrs. Dept. of Geology and Geography.
L. Frankel, and D. J. Mead.
Journal of Sedimentary Petrology, Vol 43, No 4, p 1090-1095, December 1973. 7 fig, 19 ref. NSF Grant GA-32067.

Descriptors: *Bottom sediments, *Estuaries, *Algae, *Aquatic microorganisms, Bacteria, *Connecticut.
Identifiers: *Mucilage, *Cementation(Natural).

Mucilaginous materials which apparently are the extracellular and autolytic products of microorganisms living on the grains and within the interstices fill many of the voids below the water-sediment interface in some estuarine sands in Connecticut. These substances are viscid, viscous, and elastic. They act as grain binders and cushions to deter extensive disruption of sediment by organisms. (Knapp-USGS)
W74-04066

SUPRATIDAL ENVIRONMENT AND GEOCHEMISTRY OF SOME RECENT DOLOMITE CONCRETIONS, BROAD SOUND, QUEENSLAND, AUSTRALIA,
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia).
P. J. Cook.
Journal of Sedimentary Petrology, Vol 43, No 4, p 998-1011, December 1973. 9 fig, 3 tab, 29 ref.

Descriptors: *Dolomite, *Diagenesis, *Tidal marshes, Shallow water, Sedimentation, Chemical precipitation, Estuaries, *Australia, Barrier islands.
Identifiers: *Broad Sound(Aust.).

Extensive supratidal flats composed dominantly of noncalcareous muds occur on the landward side of thick mangrove swamps around the margins of Broad Sound, central Queensland coast. During inundation by spring or storm tides, abundant algal growth takes place on the mudflats but for the rest of the time they are subaerially exposed and subject to desiccation. As a result, a thin veneer of evaporites covers the surface of the flats and large gypsum crystals form just below the surface. Interstitial pore waters are hypersaline, with salinities in excess of 120 ppt being recorded. The Mg/Ca and K/Ca ratios become particularly high in these brines, attaining values of up to 9.9 and 2.2 respectively, primarily as a result of the removal of Ca from solution, in the form of gypsum. The supratidal muds are generally low in calcium carbonate but dolomitic concretions do occur in the Charon Point area. These concretions are composed of low magnesium calcites, and calcian dolomites with a compositional range of Ca0.59 Mg0.41 C03 to Ca0.65 Mg0.35 C03. Electron microprobe, X-ray diffraction and whole rock analyses all suggest that the dolomites have formed by dolomitization of calcite. The dolomitization is associated with ferruginization, and possibly also phosphatization. Radiocarbon age determinations on associated wood and shell material and on the concretions indicate that the dolomitization has occurred within the past 3,000 years. (Knapp-USGS)
W74-04069

PHYSICAL EFFECTS OF MAINTAINING DRAINAGE CHANNELS IN NORTH CAROLINA'S COASTAL AREA,
Soil Conservation Service, Raleigh, N.C.
For primary bibliographic entry see Field 2E.
W74-04075

DISCHARGE AND FLOW DISTRIBUTION, COLUMBIA RIVER ESTUARY,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 5B.
W74-04172

IMPACT OF A POWER PLANT ON A SUBTROPICAL ESTUARINE ENVIRONMENT,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
For primary bibliographic entry see Field 5C.
W74-04189

A MODEL OF SALT INTRUSION IN A PARTIALLY MIXED ESTUARY,
New York Inst. of Ocean Resources, N.Y.
For primary bibliographic entry see Field 5B.
W74-04204

GEOMETRY AND DEVELOPMENT OF SPIT-BAR SHORELINES AT HORSESHOE COVE, SANDY HOOK, NEW JERSEY,
Columbia Univ., New York. Dept. of Geology.
W. E. Yasso.
Available from NTIS as AD-601 221, for $3.00 paper copy, $1.45 microfiche. Technical Report No. 5, prepared for Office of Naval Research, Geography Branch, 1964. 104 p, 56 fig, 2 tab, 91 ref, 4 plates. Nonr 266(68).

Descriptors: *New Jersey, *Beaches, *Sand spits, *Sand bars, *Shores, *Sedimentation, *Shallow water, Hurricanes, Fetch.
Identifiers: Sandy Hook(NJ), Beach changes, Wind generated waves.

Because only local wind-generated waves are effective in causing beach changes along the Sandy Hook Bay Shoreline, the Horseshoe Cove-Arrowsmith Beach area offers an uniquely simplified environment for study of foreshore spit-bar growth. Regression analyses of geometric elements of lower-foreshore spit-bar transverse profiles showed that no single lower-foreshore spit-bar can accurately be described as the progenitor of the next upper-foreshore spit-bar to be formed. An upper-foreshore spit-bar grows from a nucleus of sediment contributed by many lower-foreshore, spit-bars, each of which maintains geometric similarity in transverse shape while migrating landward on the beach. Mechanical analyses of 33 samples of lower-foreshore spit-bar crest sediment show a persistent decrease in mean diameter toward the distal terminus. Spit-bars, both in plan and transverse profile, seem to represent an equilibrium form that is maintained even under extreme tide range and attack of large waves such as those generated by Hurricane Donna in 1960. Spit-bar growth stages and log-spiral parameters for upper-foreshore spit-bars were combined with plan configuration of Arrowsmith Beach, the feeder beach, in order to create a model of shoreline development in which pure translation of the entire shoreline to the southeast, in annual increments, is sufficient to explain observed changes. (Sinha-OEIS)
W74-04206

WIND TUNNEL MEASUREMENTS OF THE WIND DISTURBANCE FIELD OF A MODEL OF THE BUZZARDS BAY ENTRANCE LIGHT TOWER,
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
E. L. Mollo-Christensen, and J. R. Seesholtz.
Available from NTIS as AD-640 628, for $6.00 paper copy, $1.45 microfiche. Prepared for Naval Underwater Weapons Research and Engineering Station, Ocean Environment Study, September 1966. 19 p, 11 fig, 1 tab, 1 ref. N140-(122)77626B.

Descriptors: Model studies, Winds, Measurement, *Lighthouses, *Bays, *Air-water interfaces, *Wind velocity, Coasts, *Massachusetts.
Identifiers: Buzzards Bay(MA), *Wind tunnel tests, Air-sea interaction.

Wind tunnel model tests were carried out to measure the wind interference created by the Buzzards Bay Entrance Light Tower in the atmospheric boundary layer. Tunnel measurements of wind profile were carried out at certain positions in the vicinity of the tower for several wind directions. The results indicate that at a distance of 50 feet from the tower the wind velocity profile may change about six percent, and larger changes are observed in certain special cases. Interference effects are obvious when the profiles from the 180 deg and 270 deg winds are compared, as the 270 deg wind results in decelerated flow and the 180 deg wind accelerated flow at the test point. In view of the high Reynold's number the rather uniform modification (displacement of the vertical velocity profile in all cases) is not surprising. It was found that with the wind from 225 deg, the maximum change of velocity attributed to the tower is 2% and is generally less, except for an area of high turbulence within 4 inches of the floor with the boundary layer fence installed when velocity changes of up to minus 6 percent are evident. (Sinha-OEIS)
W74-04207

MODERN SEDIMENTS OF WILLAPA BAY, WASHINGTON: A COASTAL PLAIN ESTUARY,
Washington Univ., Seattle. Dept. of Oceanography.
R. S. Andrews.
Available from NTIS as AD-619 898, for $6.00 paper copy, $1.45 microfiche. Technical Report No. 118, Reference M65-8, May 1965. 43 p, 11 fig, 5 tab, 46 ref, 4 append. AEC-AT(45-1)-1725, Nonr-477(10), Nonr-477(37).

Descriptors: *Columbia River, *Coasts, *Estuaries, *Sediment transport, *Littoral drift, *Washington.
Identifiers: Willopa Bay(Wash), Shoaling, Spits, Tidal flats.

Willapa Bay, a coastal plain estuary, contains extensive tidal flats cut by channels and distributaries. Well-sorted fine sand occurs throughout the bay, with increasing amounts of silt- and clay-size sediment present on the tidal flats near the south end of the bay and adjacent to the mouths of rivers flowing into the bay. The channels are generally scoured of this fine sediment by strong bottom currents. Organic carbon and organic nitrogen contents increased with decreasing mean grain-size, and the ratio of carbon to nitrogen revealed two types of organic matter in the bay. One type, associated with the fine-grained sediment on the tidal flats, had an average ratio of 13.8; the other type, associated with the coarser channel sediments, had an average ratio of 6.1. At the bay entrance a littoral drift to the north results in extensive shoaling north of Leadbetter Point and erosion on Cape Shoalwater. A southward migration of the channel through the tidal delta off the bay entrance indicates a littoral drift to the south in this area. Spits and shoals forming inside the bay entrance are a result of a net influx of fine sand into the bay from the eroding cape. The distribution of brackish-water to marine suites of Foraminifera is closely related to the sedimentary environments in the bay. Heavy minerals indicate source areas for the sediment from the Columbia River drainage basin as well as the Willapa Bay drainage basin. Fine sand on the tidal flats east of Long Beach Peninsula is a relict of the growth of the spit. (Sinha-OEIS)
W74-04209

AN INVESTIGATION OF BOTTOM CHANGES IN MONTEREY HARBOR (1932-1969),
Naval Postgraduate School, Monterey, Calif.
R. J. Lennox.
Available from NTIS as AD-706 032, for $3.00 paper copy, $1.45 microfiche. MS thesis, June 1969. 179 p, 12 fig, 4 tab, 8 ref, 6 append.

Descriptors: *Harbors, Sedimentation, *Beaches, Breakwaters, *Sediment transport, *Waves(Water), Coasts, Coastal structures, *California, Sands.
Identifiers: Monterey Harbor(Calif), *Shoaling, Nearshore, *Bottom topography.

Bottom changes occurring in Monterey Harbor from 1932-1969 were analyzed by numerical computer methods using 15 selected hydrographic surveys. Results indicate that the major portion of the harbor has been shoaling in the mean since 1932. The long-term shoaling rate has been 0.4 to 4.0 feet per decade in the beach and nearshore zones and along the breakwater; and less than 0.25 feet per decade in the stable outer harbor. The accretion rate averaged 17,500 cubic yards per year from 1932-1969 but only 7,100 cubic yards per year for 1947 to 1969. The shoaling is believed due to the construction of the Coast Guard Breakwater in 1931-1934. It is deduced that prior to 1960 the excess sand was carried into the harbor by littoral transport from Del Monte Beach and by wave currents around the breakwater. Construction of the solid wall on Warf 2 in 1960 cut off the former sand supply. Local redistribution of sand in the beach and nearshore zones of the harbor is large and results in areas of significant accretion and erosion between surveys. Dredging operations have had only short-term effectiveness because the spoil has been retained within the harbor. (Sinha-OEIS)
W74-04211

MONTEREY BAY BIBLIOGRAPHY.
Moss Landing Marine Labs., Calif.
Available from NTIS as COM-71-01006 for $6.00 paper copy, $1.45 microfiche. Technical Publication 71-1, 1971. D. Baron, editor 259 p.

Descriptors: *California, *Bibliographies, *Marine geology, Coasts, Shores, Beaches, Bays, Oceanography, Resources, Meteorology, Coastal engineering, Recreation, *Marine biology, *Fisheries.
Identifiers: *Monterey Bay(CA), Physical geography.

A partial, provisional bibliography is presented of scientific and general papers, reports, books, and miscellaneous publications which deal directly or indirectly with the Central California Coast. Subject headings include geology, physical geography, oceanography, meteorology, coastal engineering, boats and boating, materials and their protection, description and travel, geography, history, recreation, marine biology, and fisheries and fish culture. Cross reference notes are included. The author index is arranged alphabetically giving date of publication and citation number which identifies the entry in the bibliography. A general index is provided with topics listed alphabetically followed by their subject headings. (See also W74-04219) (Sinha-OEIS)
W74-04218

MONTEREY BAY BIBLIOGRAPHY. SUPPLEMENT NUMBER ONE.
Moss Landing Marine Labs., Calif.
Available from NTIS as COM-73-10300 for $3.00 paper copy, $1.45 microfiche. Technical Publication 72-8, 1972. D. Baron, compiler 103 p. SGP2-94.

Descriptors: *California, *Bibliographies, *Marine geology, Coasts, Shores, Beaches, Bays, Oceanography, Resources, Meteorology, Coastal engineering, Recreation, *Marine biology, *Fisheries.
Identifiers: *Monterey Bay(CA), Physical geography.

This is a supplement to the Monterey Bay Bibliography and is presented in the same format. Cross reference notes are included. The author index is arranged alphabetically giving date of publication and citation number which identifies the entry in the bibliography. A general index is provided with topics listed alphabetically followed by their subject headings. (See also W74-04218) (Sinha-OEIS)
W74-04219

FINE STRUCTURE MEASUREMENT OF TEMPERATURE AND MOISTURE OVER THE MONTEREY BAY,
Naval Postgraduate School, Monterey, Calif.
L. R. Colvert.
Available from NTIS as AD-743 702 for $3.00 paper copy, $1.45 microfiche. MS thesis, March 1972. 102 p, 43 fig, 23 tab, 5 ref, append.

Descriptors: *California, *Fog, *Prediction, Temperature, Atmospheric pressure, *Moisture, Weather, Measuring instruments, Data reduction, Meteorological data, Visibility, Inversion, Cloud cover, Air-water interfaces, *Air temperature.
Identifiers: Monterey Bay(CA), *Fog bank, Vertical profiles, Mixing ratio, Upper air soundings, *Stratus clouds.

Temperature, pressure and moisture measurements were made from the surface to 2,000 ft over the Monterey Bay during several different synoptic conditions. Data collection was made from ground level and a helicopter. There are many small scale fluctuations in the fine structure of the lower layers of the atmosphere that affect the formation of fog in small localized areas. The data indicate a close relationship between the inversion layer and fog formation; for example, fog formation occurred at the base of the inversion on four different profiles. Evidently, fog is not triggered by a large change in one of its associated parameters, but rather by very small changes in one or several of these parameters. These small changes may be local and shortlived resulting in limited fog, or they may be of synoptic scale and result in wide-spread fog. Large areas in which fog is prevalent can normally be predicted from the daily upper soundings now available; however, more knowledge and data on a finer scale appears to be necessary to predict fog accurately on a local basis. (Sinha-OEIS)
W74-04222

AN OCEANOGRAPHIC INVESTIGATION OF THERMAL CHANGES IN MONTEREY BAY, CALIFORNIA, SEPTEMBER 1971 - JANUARY 1972,
Naval Postgraduate School, Monterey, Calif.
J. J. McClelland, Jr.
Available from NTIS as AD-743 084 for $3.00 paper copy, $1.45 microfiche. MS thesis, March 1972. 101 p, 52 fig, 12 ref.

Descriptors: *California, Seasonal, *Upwelling, *Currents(Water), *Coasts, Isotherms, *Water temperature.
Identifiers: Monterey Bay(CA), Davidson current, *Sea surface temperature, Thermal structure, Geostrophic currents.

Nine oceanographic stations in Monterey Bay were occupied on at least weekly intervals from 21 September 1971 through 28 January 1972. During this period the three oceanic seasons described by previous investigators were observed. Measured thermal conditions were compared to previously derived longterm mean values. The magnitude of the short-period thermal fluctuations was comparable to that noted in earlier investigations. The changes in seasonal thermal structure were greater and more rapid than climatology implied. Unusually weak upwelling in August 1971 was followed in October by stronger than normal upwelling. This resulted in an interruption in the Oceanic Period and delayed the start of the Davidson Current regime in the bay. The network of regularly occupied stations was more extensive than had been previously possible. Quasi-synoptic observations between two offshore stations indicated north-south geostrophic current velocity components on the order of 2 to 4 cm/sec. (Sinha-OEIS)
W74-04223

THE DESIGN OF THE MONITORING SYSTEM FOR THE THERMAL EFFECT STUDY OF THE SURRY NUCLEAR POWER PLANT ON THE JAMES RIVER,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5B.
W74-04246

COAGULATION IN ESTUARIES,
North Carolina Univ. Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 5B.
W74-04257

'INTERNAL WAVES' ADVANCING ALONG SUBMARINE CANYONS,
Scripps Institute of Oceanography, La Jolla, Calif. Geological Research Div.
For primary bibliographic entry see Field 2E.
W74-04261

ASSESSMENT OF COASTAL CHANGES WITH THE AID OF PHOTOGRAMMETRIC AND COMPUTER-AIDED TECHNIQUES,
University Coll. of Wales, Aberystwyth. Dept. of Geography.
For primary bibliographic entry see Field 7B.
W74-04271

THE INFLUENCE OF SUSPENDED PARTICLES ON THE PRECIPITATION OF IRON IN NATURAL WATERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
For primary bibliographic entry see Field 5B.
W74-04272

SOME PHYSICAL AND CHEMICAL PROPERTIES OF THE GULF OF CORINTH,
Washington Univ. Seattle. Dept. of Oceanography.
J. J. Anderson, and E. C. Carmack.
Estuarine and Coastal Science, Vol 1, No 2, p 195-202, July 1973. 6 fig, 3 ref. NSF Grant GA-24875; ONR Contract N-00014-67-A-0103-0014.

Descriptors: *Oceanography, *Water circulation, Currents(Water), Bathymetry, Dissolved oxygen, Thermal stratification, Nutrients, *Bays, Water pollution sources.
Identifiers: *Gulf of Corinth, Ionian Sea, Mediterranean Sea.

The Gulf of Corinth is a silled embayment opening into the Ionian Sea on the west and through The Aegean Sea on the east. Winter cooling of the nearshore waters results in convective overturn and renewal of the deep water of the basin. Renewal at the intermediate depths occurs when Ionian Sea water enters the basin over the sill. The basin acts as a slight nutrient trap. (Knapp-USGS)
W74-04273

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3B. Water Yield Improvement

WATER AVAILABILITY AND GEOLOGY IN MARION COUNTY, ALABAMA,
Geological Survey of Alabama, University.
For primary bibliographic entry see Field 4B.
W74-03810

WATER AVAILABILITY IN MOBILE COUNTY, ALABAMA,
Geological Survey of Alabama, University.
For primary bibliographic entry see Field 4B.
W74-03811

APPRAISAL OF GROUND-WATER AVAILABILITY AND MANAGEMENT PROJECTIONS, WALLA WALLA RIVER BASIN, WASHINGTON AND OREGON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 4B.
W74-03812

LOWER COST WATER HARVESTING METHODS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
K. R. Cooley, L. E. Myers, and G. W. Frasier.
In: Proceedings of the Symposium on Interdisciplinary Aspects of Watershed Management, August 3-6, 1970, Montana State University, Bozeman, p 27-41, 1970, 1 fig., 2 tab., 18 ref.

Descriptors: *Water supply development, *Water harvesting, *Costs, *Water yield improvement.
Identifiers: Vegetation management, Land alteration, Ground cover, Chemical treatments.

Water supplies can be greatly increased by water harvesting, a process of collecting water from areas treated to increase runoff. Four alternative harvest methods are discussed. In the first, land alterations, vegetation is cleared, the soil is conditioned to encourage runoff, and runoff is collected from natural drains or drainage ditches. This method is presently being used in Australia. Vegetation management is accomplished by substituting differing forms of vegetation to encourage runoff. An Arizona experiment using this method increased runoff by 3 inches per year. A third method, chemical treatment, is used to prevent percolation. Some difficulties of erosion and treatment effectiveness have arisen, although encouraging results have been obtained by using sodium methyl silanolate. Ground cover is a method where an impermeable barrier is placed on the land. The lowest cost form of this method is the use of already existing pavement such as highways. Comparing site preparation and catchment construction costs to supply a given water supply for a given site shows that, for inexpensive land, the land alteration methods are the cheapest. As land costs increase, the water repellent chemical method and then the ground cover method become the most economical. (Schroeder-Wisconsin)
W74-03952

DISCHARGE SYSTEM FOR THE A.D. EDMONSTON PUMPING PLANT,
California State Dept. of Water Resources, Sacramento.
R. B. Jansen.
Journal American Water Works Association, Vol 65, No 11, p 710-716, November 1973. 4 fig, 8 photo, 1 tab.

Descriptors: *Dams, *Dam construction, *Water supply development, *Cost-benefit ratio, *Hydraulic valves-butterfly valves, Discharge lines, Surge tanks, Multiple purpose projects, Hydrology, Water distribution(Applied), Water yield improvement, Tunneling, Water delivery, Waterworks, Concrete construction.

The California Water Project includes the highest dam and largest pumping plant in the world. Approximately 450 major construction contracts were involved in this project which distributes water statewide from the mountain watersheds in Northern California to the coastal plains in Los Angeles. The project itself has many precedent setting aspects including a project-wide remote control system for instantaneous adjustments. The A.D. Edmonston pumping plant lifts more water against a greater pressure than any other plant in the United States. The pumps in the system are described and then the separate features of the plant, the discharge values, the manifolds, the discharge lines, the surge tank and the filling and emptying styles are described in detail. A new style of manifold was employed, tunneling was preferred in the discharge lines, and maintenance problems were cured by the use of a butterfly valve in the filling and emptying lines. (Sutton-Florida)
W74-04038

USE OF PHYTOPHAGOUS FISH TO CONTROL AQUATIC PLANTS,
Instytut Rybactwa Srodladowego, Zabieniec (Poland). Dept. of Fish Culture.
K. Opuszynski.
Aquaculture, Vol 1, No 1, p 61-74, 1972. 4 fig, 29 ref.

Descriptors: *Aquatic weed control, *Fish, *Carp, Water temperature, Heated water, Fisheries, Tropical regions, Eutrophication, Fish diets, Temperature.
Identifiers: *Phytophagous fish, Hypophthalmichthys molitrix, Ctenopharyngodon idella.

Effectiveness of grass carp in control of water weeds depends on several factors, the most important being water temperature, plant species, individual weight of fish, and stock density. Work on acclimatization of Ctenopharyngodon idella (grass carp) is at present being carried out in Europe, America, and Africa. This species belongs to the family Cyprinideae and reaches a maximum weight over 30 kg and length over one meter. They are warm water fish, the upper lethal temperature for fry being 38-39C; however they survive well wintering at 1-2C. Their oxygen requirements are low and their type of food varies in relation to size. Food coefficients for one-year-old grass carp fry at various temperatures are presented. Foods most desired are soft submerged plants. Aquatic plants readily consumed include Elodea canadensis, Ceratophyllum demersum, Potamogeton pectinatus, and Myriophyllum spicatum. Stocking of water bodies heated by thermal power station effluents with grass carp, in a tropical climate as well as in southern Europe, may solve the problem of overgrowth of inland water bodies without use of the traditional methods. The only condition is that the environment must fulfill the vital requirements of the fish. (Jones-Wisconsin)
W74-04106

WATER-MANAGEMENT STUDIES OF A STREAM-AQUIFER SYSTEM, ARKANSAS RIVER VALLEY, COLORADO,
Geological Survey, Pueblo, Colo.
For primary bibliographic entry see Field 4B.
W74-04262

3C. Use Of Water Of Impaired Quality

AGRICULTURAL IMPACT ON WATER QUALITY IN WESTERN RIVERS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-03796

CALCIUM LOSS FROM PLANT ROOTS DURING OSMOTIC ADJUSTMENT,
Arizona Univ., Tucson.
For primary bibliographic entry see Field 2I.
W74-03924

IRRIGATED RECREATIONAL TURFGRASS WITH SEWAGE EFFLUENT,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
G. V. Johnson.
Progressive Agriculture in Arizona, Vol 25, No 5, p 8-9, 15, September-October 1973. 1 fig, 5 ref.

Descriptors: *Turf grasses, *Sewage effluents, *Nitrogen, *Irrigation effects, *Crop response, Arizona, Landscaping, Golf courses, Lawns, Recreation facilities.

Studies at the University of Arizona Turfgrass Research Center show that treated municipal effluent can be beneficially used to irrigate field crops, but when such crops are not grown near the supply, such use is not always economically feasible. Because recreational turfgrasses, used most effectively in small rapidly growing communities, require high nitrogen applications, the use of effluent for this purpose is being demonstrated successfully. Annual consumptive water use by creeping bentgrass, a cool season turfgrass used for golf putting greens in the Tucson area is about 56 inches, and this use is similar for other turfgrasses. Turfgrasses will use an average of 1 pound of nitrogen per thousand feet per month, for an annual nitrogen consumption of approximately 525 pounds per acre. Assuming an average nitrogen concentration of 20 ppm in the effluent, one acre foot of effluent would supply 54 pounds of nitrogen and about 9.7 acre feet would be required to satisfy the nitrogen requirement of an acre of turfgrass for one year. Approximately 5 acre feet of the applied effluent containing less than one ppm nitrate-nitrogen and of excellent overall quality, would be available for recharge of groundwater. Disposal of effluent in this manner does not carry the stigma of pollution hazards associated with field crop irrigation or discharge of effluent into dry stream beds. It is technically feasible for most of the southwestern U.S. where turfgrasses are grown all year. (Paylore-Arizona)
W74-03929

GROSS CHEMICAL COMPOSITION OF MURGAB OASIS DESERTIFIED AND ANCIENT-IRRIGATION SOILS (IN RUSSIAN),
I. S. Rabochev, M. P. Aranbaev, A. G. Gaipova, and M. M. Niyazova.
Probl Osvoeniya Pustyn'. 6. p 23-35, 1971, English summary.
Identifiers: *Carbonates(Soils), Chemical composition, Deserts, Irrigation, Silicon, Soils, *USSR(Murgab Oasis), Weathering, *Soil chemistry.

The investigated soils originated from thick irrigation deposits and were formed as a result of prolonged irrigation by river mud waters with great amounts of suspended matter. They are characterized by high rate of carbonates and CaCO3 prevalence over MgCO3. The high rate of the suspended matter weathering, great amounts of quartz and subsequent soil-formation processes increase the amount of SiO2.--Copyright 1973, Biological Abstracts, Inc.
W74-04123

SEASONAL VARIATIONS OF THE SALINITY IN SOME PROFILES AND IN THE WATER TABLE OF THE SODIC SOILS OF CAMARGUE: PRELIMINARY RESULTS (IN FRENCH),
Institut National de la Recherche Agronomique, Montpellier (France). Service d'Etude des Sols.
For primary bibliographic entry see Field 2G.
W74-04124

APPRECIATION OF THE FITNESS FOR UTILIZATION OF THE SOILS OF PROVENCE,
For primary bibliographic entry see Field 2G.
W74-04125

3D. Conservation In Domestic and Municipal Use

COMMUNITY WELL-BEING AS A FACTOR IN URBAN LAND USE PLANNING,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 6B.
W74-03751

AN EVALUATION OF URBAN FLOOD PLAINS,
For primary bibliographic entry see Field 6F.
W74-03756

INTEGRATING NATURAL RESOURCES INTO AREAWIDE AND LOCAL PLANNING: THE SOUTHEASTERN WISCONSIN EXPERIENCE,
Southeastern Wisconsin Regional Planning Commission, Waukesha.
For primary bibliographic entry see Field 6B.
W74-03965

LEVELS OF ASSESSMENT,
Upper Mississippi River Basin Commission, Twin Cities, Minn.
For primary bibliographic entry see Field 6B.
W74-04035

DEVELOPMENTS IN WATER UTILITY LAW, 1972-1973, AMERICAN BAR ASSOCIATION REVIEW.
For primary bibliographic entry see Field 5G.
W74-04037

3E. Conservation In Industry

THE IMPACT OF COSTS ASSOCIATED WITH NEW ENVIRONMENTAL STANDARDS UPON THE PETROLEUM REFINING INDUSTRY. PART II. STRUCTURE OF THE INDUSTRY.
Sobtoka (Stephen) and Co., New York.
Available from the National Technical Information Service as PB-207 198, $4.50 in paper copy, $1.45 in microfiche. Prepared for Council on Environmental Quality, Washington, D.C., November 1971. 56 p. 16 exhibits.

Descriptors: Costs, *Oil industry, *Pollution abatement, Structure, *Cost analysis, Economic impact, Water quality standards.
Identifiers: *Petroleum refining industry.

Data and background information necessary for the evaluation of the economic impact of the costs of pollution abatement in petroleum refining industry are presented. Analysis of demand indicates four categories of products which would be differently affected by abatement costs: gasoline, intermediates, residual, and other. Analysis of supply was limited by data availability for large refineries although case study provided some insight on the viability of small refiners. For most firms refining accounted for a smaller portion of their activity compared to marketing. Refinery investment and employment each represent less than 25% of total investment and employment in the domestic oil industry. Considerable variation in age of plant and output capacity was found. Steady growth and a trend toward larger plant size are expected in the future. (See also W73-012708 and W73-01598) (Weaver-Wisconsin)
W74-04076

THE ECONOMIC IMPACT OF POLLUTION CONTROL. AN OVERVIEW, A SUMMARY OF RESEARCH STUDIES.
Chase Econometric Associates, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 5G.
W74-04077

ECONOMIC IMPACT OF ANTICIPATED PAPER INDUSTRY POLLUTION-ABATEMENT COSTS. PART III. ECONOMIC ANALYSIS.
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W74-04078

THE EFFECTS OF POLLUTION CONTROL ON THE NONFERROUS METALS INDUSTRIES. COPPER. PART I. INTRODUCTION AND EXECUTIVE SUMMARY.
Charles River Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W74-04081

THE EFFECTS OF POLLUTION CONTROL ON THE NONFERROUS METALS INDUSTRIES. COPPER. PART II. STRUCTURE OF THE INDUSTRY.
Charles River Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W74-04082

CORROSION AND ITS PREVENTION IN WATERS,
National Chemical Lab., Teddington (England).
For primary bibliographic entry see Field 8G.
W74-04151

THE DIRECT-CYCLE NUCLEAR GAS TURBINE WITH ECONOMICAL DRY AIR COOLING,
Gulf General Atomic Co., San Diego, Calif.
For primary bibliographic entry see Field 5D.
W74-04230

THE ENVIRONMENTAL AND REGULATORY ASPECTS OF THE BREEDER REACTOR,
Atomic Energy Commission Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-04238

3F. Conservation In Agriculture

PRELIMINARY INDICATORS OF INCOME/WEALTH REDISTRIBUTION ASSOCIATED WITH BUREAU OF RECLAMATION PROJECTS,
Utah State Univ., Logan. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-03771

INCREASING WATER UTILIZATION EFFICIENCY OF A PASTURE GRASS BY INCREAS-

ING AFTERMATH THROUGH PLANT SELECTION,
South Dakota State Univ., Brookings. Depl. of Plant Science.
J. G. Ross.
Available from the National Technical Information Service as PB-227 382; $3.25 in paper copy, $1.45 in microfiche. South Dakota State University, Water Resources Institute Completion Report, April 1973, 27 p, 9 tab, 4 fig, 5 ref. OWRR A-026-SDAK(1).

Descriptors: *Bromegrass, *Forage grasses, *Plant breeding, *Vegetation regrowth, Genetics, Crop production, Forages, Grasses, Crop yield, *Water utilization, Water conservation, Range grasses, Pastures, Agronomic crops, Feeds, Grasslands, Grazing, *South Dakota.

Optimum water use efficiency of crop plants is necessary to obtain maximum land use. Smooth bromegrass is the best cultivated forage in South Dakota, producing abundant forage in spring and tending to become dormant during the summer. It is suggested that the water use efficiency of this grass could be increased by selecting for a variety with improved regrowth in the summer so that it could continue to provide forage during the entire season. Plants with outstanding regrowth characteristics were selected from two irrigated nurseries. Mean measurements such as yield regrowth, net carbon dioxide exchange and height were significantly different between genotypes. Such measurements usually correlated positively with growth potential. Efficiency of photosynthesis was measured by net carbon dioxide exchange and was unrelated to ability of plants to grow back after cutting. Components of forage yield were closely related to regrowth. A significant environment x genotype interaction occurred which indicates that differences between seasons in production of regrowth occurs. However, some plants were outstanding under both environments. Eight of these were selected for further genetic study. Selection for a synthetic variety with superior regrowth characteristics will be more difficult because of the high interaction of genotype and environment, but the reported results indicate that progress has been made. (Muller-Arizona)
W74-03773

ACCUMULATION OF ROOT MASS IN PERENNIAL LEGUME PLOTS ON ERODED SOILS (IN AZERBAIDZHAN),
K. A. Alekperov, and S. G. Guseinov.
Dokl Akad Nauk Az SSR, Vol 27, No 9, p 100-103, 1971, Illus, English summary.
Identifiers: Alfalfa, Eroded soils, Fertility, *Legume plots, Perennial, *Root mass, Sainfoin, Soils, *USSR(Azerbaidzhan).

Experiments on root accumulation in sainfoin, alfalfa and their mixture were conducted on eroded soil in Azerbaidzhan. More than 50% of the root mass was accumulated in the upper 0-10 cm of the soil. The perennial legumes produced a greater root mass in the second and third yr than in the first. The general amount of root mass during the experiment exceeded the control (natural vegetation) by 5-6 times. The legumes accumulated a larger root mass from yr to yr, increased soil fertility and build up the granular structure of the soil.--Copyright 1973, Biological Abstracts, Inc.
W74-03874

FIELD SHELTERBELT AFFORESTATION AND GREENERY PLANTING,
Vi. V. Boznikov, F. S. Visloguzov, and G. M. Mordvintsev.
Kainar: Alma-Ata. 1970. 167 p, illus.
Identifiers: *Forestation, Greenery, Meteorological conditions, Pest control, Planting, *Shelterbelts, *Agriculture.

Studies on the following problems are presented: zoning of agricultural amelioration by forestry; agrometeorological and economic effectiveness of field shelterbelts, their planning, spacing, construction and agricultural techniques; trees and shrubs of the shelterbelts and of greenery plantations; the pests and measures for their control; conversion of the existing shelterbelts, and planting in populated rural localities.--Copyright 1973, Biological Abstracts, Inc.
W74-03883

NITRATE LEACHING IN SOIL ON RUTGERS AGRICULTURAL RESEARCH CENTER AT ADELPHIA, NEW JERSEY,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
For primary bibliographic entry see Field 5B.
W74-03897

HARVEST QUALITIES OF VARIOUS SIZES OF HARD WINTER WHEAT SEEDS UNDER IRRIGATED CONDITIONS IN THE SOUTHERN STEPPES OF THE UKRAINE, (IN RUSSIAN),
A. Ya. Gasanenko, and V. F. Piskun.
Dokl Vses Ord Lenina Akad S-Kh Nauk Im V I Lenina. 12 p, 8-10. 1971. Illus.
Identifiers: *Harvest, Irrigation, Seeds, Sizes, Steppes, *Ukraine, *Wheat seeds, Winter wheat.

The harvest of irrigated hard winter wheat depends largely upon quality of the seeds. Irrigation increases harvest of hard and medium seeds. Seeding with such seeds of hard winter wheat as 'Novomichurinka' increased harvest by 3.0-4.7 c/ha in comparison to soft ones. The harvest increase from hard and medium wheat is noticeable in the first year, in subsequent years this difference levels off.--Copyright 1973, Biological Abstracts, Inc.
W74-03915

INVESTIGATION OF THE DYNAMICS OF THE MOISTURE STATE OF THE SOIL UNDER SEVERAL YEARS OF FORAGE CROPS AND UNDER SAINFOIN, (IN CZECH),
Vyzkumny Ustav Rastlinnej Vyroby, Piestanoch (Czechoslovakia).
J. Kosik.
Ved Pr Vysk Ustavu Rastlinnej Vyroby Piestanoch. 9 p, 179-188. 1971. Illus. (English summary).
Identifiers: Bean, Crops, *Forage crops, *Sainfoin, *Soil moisture, Sunflower.

A field trial was made at Piestany on grove-carbonate and clay-loam soil to determine the changes of soil moisture under sainfoin, sunflower and under horse-bean, cultivated for green matter production. Moisture was measured by the weighing method at depths of 5-10, 25-30, 35-40, 45-50, 55-60, and 65-70 cm. The lowest water content was under sainfoin especially during its first and second yr of utilization. The greatest decrease of soil moisture under sainfoin was observed in May-June. The soil moisture under sainfoin decreased approximately in a linear manner with depth. The highest content of soil moisture was under horsebean, which dried the soil markedly only to a depth of 20 cm. Sunflower, however, removed the soil humidity also from greater depths and lowered the humidity in the whole investigated profile of the soil.--Copyright 1973, Biological Abstracts, Inc.
W74-03917

WATER PRODUCTION FUNCTIONS AND IRRIGATION PROGRAMMING FOR GREATER ECONOMY IN PROJECT AND IRRIGATION SYSTEM DESIGN AND FOR INCREASED EFFICIENCY IN WATER USE,
California Univ., Riverside. Dept. of Water Science and Engineering.
J. I. Stewart, R. M. Hagan, W. O. Pruitt, and W. Hall.
Availability from NTIS as PB-219 609 $6.00 in paper copy, $1.45 in microfiche. Final report to the Bureau of Reclamation, March 1973. 165 p, 31 fig, 19 tab, 84 ref. 14-06-D-7329.

Descriptors: *Irrigation practices, *Irrigation systems, *Irrigation efficiencies, *California, Crop response, Surface irrigation, Irrigation operation and maintenance, Water distribution(Applied), Water utilization, Water requirements, Evapotranspiration, Optimization, Corn(Field), Sorghum, On-site investigations, *Water utilization.
Identifiers: *Water production functions.

Results are presented of a continuing long-term study attempting to make quantitative predictions of the relationships between yields of principal crops and water. Results of four years of field experiments on corn are included with two years of similar data for sorghum, along with conceptualization and detailed methodology of a comprehensive approach to planning the use of water in agriculture. The method combines researched genetic characteristics of crops with planned irrigation site measurements of climate, soil and irrigation capabilities to estimate four quantitative parameters. These are: generalized relative value functional relations between yield and evapotranspiration of given crop varieties, generalized absolute value yield versus evapotranspiration functions for a given crop varieties in measured evaporative conditions, absolute value yield versus irrigation functions for given crop varieties in measured conditions of climate, soil, and irrigation capacity; and optimal programs of dates and depths of irrigation suited to give crop varieties in measured environments. (Muller-Arizona)
W74-03920

A RESISTANCE MODEL TO PREDICT EVAPOTRANSPIRATION AND ITS APPLICATION TO A SUGAR BEET FIELD,
Texas A and M Univ., College Station. Dept. of Soil and Crop Sciences.
For primary bibliographic entry see Field 2D.
W74-03921

WEST SIDE CROP ADAPTABILITY STUDY.
California State Dept. of Water Resources, Sacramento.
Available from Office of Procurement, Documents Section, P.O. Box 20191, Sacramento, Calif. 95820 for $3.00 per copy. Bulletin No 163, March 1970, 83 p, 6 fig, 16 tab, 5 ref.

Descriptors: *Irrigable lands, *Air temperature, *Crop response, *Climatic data, Irrigation, Arid lands, *California, Citrus fruits, Vine crops, Soil types, Saline soils, Salinity, Boron, Windbreaks, Environmental effects.
Identifiers: *San Joaquin Valley.

Data accumulated on a 625,000-acre block of undeveloped irrigable land along the south-western and southern edges of the San Joaquin Valley over a five-year period from 82 climatological stations indicate that large areas apparently are adaptable to citrus and vineyard cultivation, although heating and wind protection will be required for citrus, and wind protection may be desirable for vineyards. The entire area is climatically suited for some deciduous fruits and nuts, and vegetable and field crops may be grown if planting times are adjusted to meet the indicated temperature conditions. Since wind will present some hazard to most crops in much of the area, use of wind breaks is indicated. Soils are mostly deep and fertile in the 80 per cent of the study area having flat or very gentle slopes. Although salinity and/or boron problems occur on about 40 percent of the land, approximately only 15 percent pose any serious problems, where leaching and drainage will be required. The

20 percent of the area having gentle-to-moderate slopes is characterized by soils of more variable depth unaffected by soil salinity or boron. Tabulations of soil and climatic data and generalized maps of soil salinity and boron are included. (Muller-Arizona)
W74-03922

ARIZONA INDIAN CORN (ZEA MAYS L.),
Arizona Univ., Tucson.
A. D. Day, D. R. Grove, and R. K. Thompson.
Journal of the Arizona Academy of Science, Vol 7, No 1, p 8-11, February 1972. 3 tab, 7 ref.

Descriptors: *Corn(Field), *Plant breeding, *Crop response, *Plant physiology, Agronomy, Crop production, Resistance, Drought tolerance, Drought resistance, Cereal crops, Grains(Crops), Field crops, Environmental effects, *Southwest U.S., Arizona.
Identifiers: *Indian Corn.

Corn has been cultivated for centuries throughout the Americas by various Indian tribes. During its propagation in the area it has adapted to many environmental conditions, the greatest occurring in the semi-arid regions of the southwestern United States. The Hopi and Papago Indians of that region have cultivated corn for hundreds of years and have developed into superior dry-land farmers. The corn which they have cultivated has been overlooked by many plant breeders developing corn for semi-arid regions throughout the world. This study compares 20 representative corn selections of this type in terms of desirable breeding characteristics. Indian flour and dent selections, and selections from the white dent Mexican June Complex were included. Significant differences in height, leaf length, leaf width, nodes per stalk, plants per plot, stalks per plot, soluble solids in stalk juice, forage yield, grain yield, grain volume-weight, and maturity were noted. Indian corn was earlier, had longer leaves, more stalks per plot, and higher grain volume-weights than selections from Mexican June Complex. (Muller-Arizona)
W74-03926

THE ECONOMICS OF SHORT-SEASON COTTON PRODUCTION IN ARIZONA,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
G. S. Willett, B. B. Taylor, and D. R. Buxton.
Progressive Agriculture in Arizona, Vol 25, No 5, p 3-5, 15, September-October 1973. 4 tab, 9 ref.

Descriptors: *Cotton, *Crop production, *Cost comparison, *Water costs, *Planting management, *Arizona, Insecticides, *Seasonal.
Identifiers: Growing season.

A number of factors favoring a short-term cotton-growing season in Arizona emerge from studies made of a conventional planting of 30,000 plants per acre to determine the relationship between various irrigation and crop termination dates and per acre profitability. Improved lint quality, earnings from earlier sales, better management of crops following the cotton season, and reduced costs are detailed. Since damage to the crop by the pink bollworm tends to be concentrated over the latter part of the growing season, the shorter season enables producers to avoid some insecticide costs. Fewer irrigations are required, resulting in lower water costs, as well as reduced power and labor requirements. Reductions in fertilizer costs are an additional plus factor, which combined with other savings offset yield losses resulting from the shorter season. Tables show that producers using cheaper Colorado River water can afford to lose about 9 percent of their full-season yield through a month shortening of the growing season and still break even; this compares to approximately 12 percent for those pumping water from 700 foot underground. The study develops guidelines based on these factors. (Paylore-Arizona)
W74-03928

ALFALFA QUALITY: IS THERE A DIFFERENCE,
Arizona Univ., Tucson.
T. J. Vorachek, A. K. Dobrenz, B. Theurer, and W. H. Hale.
Progressive Agriculture in Arizona, Vol 25, No 5, p 12-15, September-October 1973. 4 fig, 2 tab, 3 ref.

Descriptors: *Alfalfa, *Forage legumes, *Water utilization, *Irrigation practices, *Seasonal, Arizona, Crop response, Forage palatability, Field crops, Taste.

The study was designed to determine to what extent varietal and seasonal factors influence total dry matter and digestible dry matter production, to aid in decisions on frequency and date of irrigation. Measurements were made on three year old experimental plots of Mesa-Sirsa, El-Unico, Sonora, and Moapa alfalfa. These cultivars differed under controlled conditions of irrigation and moving in the apparent digestible dry matter and forage produced, with Mesa-Sirsa being the most productive, Sonora and Moapa least. The Mesa-Sirsa was also the most efficient cultivar in water-use. The study supports the practice of withholding water from alfalfa during July and August when the crop tends to slump in production. The observations of this study should be of interest to the alfalfa grower since the water requirement of a forage crop in the arid southwest is important both economically and from the viewpoint of availability. Since differences in digestibility among the four cultivars were insignificant, producers should select those giving the best dry forage yield for the most efficient use of water required, in order to obtain maximum production. All experiments seem to point to Mesa-Sirsa as being the best of the four used. (Paylore-Arizona)
W74-03930

THE EFFECT OF DROUGHT ON THE COTTON WATER REGIMEN AT DIFFERENT STAGES OF ITS DEVELOPMENT, (IN RUSSIAN),
K. Mirzambetov.
Ekologiya. Vol 3, No 4, p 103-105, 1972.
Identifiers: *Cotton, Development, *Drought effects, Water regimen, *Cultivars.

Two cultivars 'S-4727' and 'Chimbai-6' were used in 80% (full capacity of the soil), and 60% and 40% experimental moisture studies during various periods of development. Cotton was most sensitive to lack of moisture during its flowering phase. 'Chimbai-6' cotton adapted better to dry conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-03942

WEED CONTROL IN SUGAR BEET CROPS IN THE KOSOVO REGION, (IN SERBO-CROATIAN),
Agricultural Inst., Pristina (Yugoslavia).
P. Zekovic.
Agrohemija. 3/4, p 123-129, 1972.
Identifiers: Crops, *Herbicides, Phenyl-4-Amino-5-Chloro, Pyridazone, *Weed control, *Sugar beets, *Yugoslavia(Kosovo region).

The efficieny of Pyramin (1-phenyl-4-amino-5-chloro-pyridazon) in the control of weeds in sugar beet crops under conditions of irrigation by sprinkling, conventional irrigation and dry farming, with the use of different amounts of NPK fertilizers was tested. The amount of the herbicide used was 5 kg/400 l water/ha. Weediness decreased in experimental areas, accompanied by an increase in yield per unit area and in sugar percentage in the root.--Copyright 1973, Biological Abstracts, Inc.
W74-03943

EFFECT OF MOISTURE STRESS UPON MAIZE PRODUCTION AND ITS ECONOMIC SIGNIFICANCE,
Natal Univ., Pietermaritsburg (South Africa). Dept. Pasture Science and Agrometeorology.
J. M. DeJager, and J. B. Mallet.
S Afr J Sci. Vol 68, No 7, p 182-186, 1972. Illus.
Identifiers: Economics, *Mathematical models, *Moisture stress, *Corn(Field), Crop production.

A mathematical model is established for determining the time of occurrence and number of days of moisture stress experienced by a maize crop during growth season. As input data the model requires values of daily evaporation and rainfall and is applicable to Doveton series soils 1.2 m in depth. Field capacity of each of 4 soil layers must be known and the manipulations account for variations in root distribution with crop development. The model was computerized and applied to data from 3 farming regions in Natal. Expected average gross margins for each area were calculated. Utilizing a figure describing the decrease in final year per unit stress day experienced, it was possible to determine the probability of occurrence of maize yields between selected limits.--Copyright 1973, Biological Abstracts, Inc.
W74-03948

SOME DATA ON THE WATER ECONOMY AND THE UTILIZATION OF WATER RESOURCES IN BULGARIA, INCLUDING IRRIGATION,
Bulgarian National Committee on Irrigation and Drainage, Sofia. Water Development Design Inst.
P. I. Munkov.
Irrigation and Power, Vol 28, No 4, p 99-105, 1972. 1 fig, 3 tab.

Descriptors: Hydrologic data, *Regional analysis, *Irrigation practices, *Water demand, Water distribution(Applied), Europe, *Water utilization.
Identifiers: *Bulgaria.

Physiographical, climatic, and hydrologic data for Bulgaria gives insight into the development of irrigation, water gauging stations, and multipurpose planning within the country. Bulgaria is a mountainous country, with lowlands and hilly regions composing only 20% of its total land area. Difficulties with limited water resources have been accentuated by growing demands for water; demands have increased over 88% in the 1965-70 period. These difficulties have made it important for the country to develop both a large water gauging network and multipurpose plan to accommodate alternative water users. Information gleaned from gauging stations has been instrumental in the formulation of plans for regulating annual and perennial runoff, permitting transfers of water between basins and utilizing water from the Danube and ground water. Irrigation water is an important element in increasing Bulgaria's agricultural productivity. The basic problem confronting agricultural planners is the shortage of agricultural labor and the need to transform the existing gravity irrigation systems into automatic systems. (Schroeder-Wisconsin)
W74-03954

WATER RENOVATION FOR UNRESTRICTED RE-USE,
Corps of Engineers, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-04034

OPTIMUM FORAGE PRODUCTION AND THE ECONOMIC ALTERNATIVES ASSOCIATED WITH GRAZING IRRIGATED WHEAT, TEXAS HIGH PLAINS,
Texas Agricultural Experiment Station, Bushland.
J. Shipley, and C. Regier.
Texas Agricultural Experiment Station Publication No 1968, p 3-11, December 1972. 4 fig, 9 tab, 1 ref.

Descriptors: *Crop production, *Irrigation efficiency, Economic efficiency, Grazing, *Wheat, *Forages, Productivity, Costs, Texas, Net income, Cattle, *Optimum development plans, Alternative costs.
Identifiers: *Texas High Plains, Opportunity cost analysis.

Irrigated winter wheat grown in the Texas High Plains is often grazed during the fall and winter. However, in early spring grazing may continue leading to a grazed-out pasture or animals may be removed from the pastures and higher risk grain production commenced. To establish guidelines for optimum water management and winter wheat grazing practices in the production of wheat, studies were conducted on a silty clay loam during a three-year period, 1969-1972. Forage and grain yield response to various fall irrigation treatments, seeding rates and lengths of grazing periods were determined. Optimal forage was produced with a 90-pound seeding rate and two fall irrigations. Average grain yields from similar seeding ranged from 49.8 to 21.8 bushels per acre when grazing was terminated March 20 and May 1, respectively. Average daily gain of cattle from November to May was 1.8 pounds based on a fall stocking rate of 1.5 400-pound animals per acre. Given current market conditions, an economic incentive was found for grazing irrigated wheat through March 20. (Weaver-Wisconsin)
W74-04086

DROUGHT-AFFECTED MITOCHONDRIAL PROCESSES AS RELATED TO TISSUE AND WHOLE PLANT RESPONSES,
Illinois Univ., Urbana. Dept. of Agronomy.
D. E. Koeppe, R. J. Miller, and D. T. Bell.
Agronomy Journal, Vol 65, p 566-569, July-August 1973. 6 fig, 1 tab, 25 ref.

Descriptors: *Plant tissue, *Moisture stress, *Plant physiology, *Membranes, Seeds, Respiration, Metabolism, Plant morphology, Transpiration, Stomata, Drought, Corn(Field).
Identifiers: *Mitochondria.

The purpose was to correlate the respiration rates of whole seedlings, excised shoots, and isolated mitochondria of Zea mays under various degrees of water stress. The oxidation rate of substrate by mitochondria isolated from water-stressed tissue decreased with increasing stress. A similar decrease in respiration rate was observed with whole shoots and excised seedlings. Seedling water content corresponded to respiration in behavior. Upon release from water stress, seedlings rapidly returned to the prestress water potential level. Mitochondrial processes were observed to be altered by water stress and these alterations were found to persist even when the mitochondria were isolated from the growing tissue. The observed decrease in the rate of whole plant respiration with increased stress may be due to membrane alterations that effect the ability of mitochondria to oxidize substrate. Comparisons of the whole plant, tissue, and cellular level responses to drought stress indicate the site of these functional alterations to be associated with the membranes of mitochondria. (Muller-Arizona)
W74-04127

DRY LAND RESEARCH IN NORTHWEST INDIA. I: EFFECT OF VARIABLE PRE-PLANTING TILLAGE ON SOIL MOISTURE, GROWTH, AND YIELD OF PEARL MILLET (PENNISETUM TYPHOIDES, S. AND H),
Haryana Agricultural Univ., Hissar (India). Dept. of Agronomy.
A. S. Malik, V. Kumar, and M. K. Moolani.
Agronomy Journal, Vol 65, p 12-14, January-February 1973. 1 fig, 2 tab, 17 ref.

Descriptors: *Soil moisture, *Cultivation, *Dry farming, *Infiltration, Retention, Storage capacity, Moisture availability, Percolation, Irrigation effects, Cereal crops, Crop response.
Identifiers: *India.

Four preplanting tillage methods (turn plowing, chiseling, double disking and no tillage) were tried on pearl millet under dry land conditions. The highest infiltration rate and lowest bulk density values were found to occur with turn plowing. This method thus had the greatest soil moisture profile throughout the growing season of the crop. Maximum soil moisture variation was observed in the 60 to 90 cm layer below the surface. Grain yield from turn-plowed plots was approximately 29 percent higher than that from plots of no tillage. Weed yield on the nontilled plots was found to be almost twice that on the tilled plot while root growth was comparatively poor. Most of the plant and soil observations showed little difference between turn plowing and chiseling, while double disking was very similar to no tillage. (Muller-Arizona)
W74-04128

THE ESTIMATION OF NET RADIATION AND POTENTIAL EVAPOTRANSPIRATION USING ATMOMETER MEASUREMENTS,
Commonwealth Scientific and Industrial Research Organization, Aspendale (Australia). Div. of Atmospheric Physics.
For primary bibliographic entry see Field 2D.
W74-04129

CULVERTS FOR FLOW MEASUREMENT IN IRRIGATION SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 4A.
W74-04131

LEAF ORIENTATION OF A COTTON PLANT,
Commonwealth Scientific and Industrial Research Organization, Griffith (Australia). Div. of Irrigation Research.
A. R. G. Lang.
Agricultural Meteorology, Vol 11, p 37-51, 1973. 12 fig, 4 tab, 18 ref.

Descriptors: *Cotton, *Leaves, *Radiation, Plant tissues, Measurement, Fiber crops, Field crops, Plant physiology, Photoperiodism, Evaporation, Distribution patterns, Irrigation.

Cotton is a commonly cultivated crop under irrigation in arid and semi-arid regions. The evaluation of the irrigation requirements for such a crop is a function of the net incident radiation to the evaporative surface of the plants, among other considerations. An understanding of the orientation of the cotton leaves aids in the estimation of this radiation. Leaf area distribution as a function of the elevation angle and azimuth are frequently thought to be random. The actual distributions for two varieties of cotton plants are reported from observations of the complete spatial coordinates of the leaves using a new apparatus. Leaves were found to have a preferential orientation toward the east during the morning and to turn with the sun and to disperse in orientation as the day proceeds. Leaf orientation distributions are given in terms of the angle between the incident solar radiation and the normal to the leaf surface, both for sunlit leaves only and for total leaves. These and similar analyses should allow an adequate understanding of problems which depend upon the geometrical location of leaves. (Muller-Arizona)
W74-04132

USE OF SPRINKLERS TO STUDY THE INFLUENCE OF POPULATION DENSITY UPON SEED COTTON PRODUCTION IN AN ARID AREA,
California Univ., Davis. Dept. of Water Science and Engineering.
F. E. Robinson, and D. Cudney.
Agronomy Journal, Vol 65, p 266-268, March-April 1973. 4 tab, 12 ref.

Descriptors: *Cotton, *Sprinkler irrigation, *Irrigation effects, *Arid lands, Plant growth, Plant population, Planting management, Seeds, *California.
Identifiers: *Imperial Valley(Calif).

The cotton growth period has been reduced by two months in the arid Imperial Valley because of the invasion of pink bollworm. Cotton residue must now be incorporated into the soil to lower the number of overwintering larvae. The reduced time of floral development led to the examination of yield potential under various plant spacing configurations. Defoliants, fertilizers, desiccants, and insecticides for pink bollworm control and water were applied through a sprinkler system. Randomized block design of Stoneville 213 and Paymaster 111A varieties included plant densities ranging from 15,000, 60,000, 242,000, and 969,000 plants/ha on a flat soil surface. Planting was accomplished by hand at 2 per dibble in a square grid pattern. Bolls per plant were found to increase with planting density while the effect of plant density on boll weight was significant on Paymaster 111A but no on the Stoneville 213. The highest seed cotton yield occurred where the plants produced the greatest number of bolls per unit area. A tendency of lower micronaire in the highest density was noted in each variety. (Muller-Arizona)
W74-04133

SELECTING A METHOD FOR SCHEDULING IRRIGATION, USING A SIMULATION MODEL.
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
W. D. Lembke, and B. A. Jones, Jr.
Transactions of the ASAE (American Society of Agricultural Engineers), p 284-286, 1972. 5 fig, 6 ref, 1 tab.

Descriptors: *Scheduling, *Soil moisture, *Rates of application, *Irrigation practices, Model studies, Corn(Field, Arid lands, Arid climates, Water balance, Irrigation progress, Soils, Field capacity, Soil management, *Simulation analysis, *Illinois.

Three irrigation scheduling practices on two soils were compared in a water balance model simulation. The practice of applying 30 percent of the available water when the soil moisture drops to the 70 percent level was the most profitable for soils with a water holding capacity of 0.8 inches per foot. The alternate practice of treating a soil at 60 percent with 40 percent of the available water was found to be uneconomical. A procedure of applying one inch of net water after any 7-day period during which less than an inch of rain falls was found satisfactory for a soil with a water holding capacity of 1.2 inches per foot. While the experiment was based on an Illinois campfield, the model simulation is applicable to any irrigated agriculture area. (Muller-Arizona)
W74-04134

SURFACE WATER STORAGE CAPACITY OF SELECTED CROP LEAVES UNDER IRRIGATION SPRAYS,
Kentucky Univ., Lexington. Dept. of Agricultural Engineering.
B. J. Barfield, F. A. Payne, and J. N. Walker.
Agricultural Meteorology, Vol 12, p 105-111. 1973. 2 fig, 4 tab, 9 ref.

Descriptors: *Vegetable crops, *Plant tissues, *Leaves, *Soil-water-plant relationships, *Sprinkler irrigation, *Irrigation effects, Moisture, Water spreading, Water distribution(Applied), Moisture content, Moisture uptake.

Lettuce, cucumber, and tomato plants were analyzed for surface water storage capacity at various sizes of spray irrigation drops, stem angles, and leaf temperature. Stem angle and leaf temperature were found not to have an influence on storage capacity while spray drop size signifi-

cantly affected storage. Lettuce was found to have the highest surface water storage capacity of 0.20 mm and cucumbers were found to have the least, at 0.11 mm. Tomatoes were found to have a capacity of 0.18 mm. These findings indicate that the use of small drop sizes or fine mist in spray irrigation will maximize the amount of water retained by the leaves of the plant. (Muller-Arizona)
W74-04135

ABSCISSION PROCESSES IN COTTON: INDUCTION BY PLANT WATER DEFICIT,
Texas A and M Univ., College Station. Dept. of Plant Sciences.
B. L. McMichael, W. R. Jordan, and R. D. Powell.
Agronomy Journal, Vol 65, p 202-204, March-April 1973. 4 fig, 15 ref.

Descriptors: *Cotton, *Moisture deficit, *Moisture tension, Leaves, Fiber crops, Plant physiology, *Soil-water-plant relationships.
Identifiers: *Abscission.

Although the shedding of cotton bolls is characteristic of this plant, the extent of such shedding is quite variable. This study examines the effect of water stress on boll and leaf abscission. Plant water deficits were induced by withholding water, and leaf water potential was measured with a pressure bomb device. A linear increase in abscission was noted with the decrease of leaf water potential from -10 to -24 bars. Older leaves were shed in response to lower water stress than were juvenal leaves. Immature bolls were sensitive to water stress while bolls remaining on the plant for 14 days were retained even under severe water stress. A predawn leaf water potential of approximately -3 bars was necessary to induce significant leaf abscission. (Muller-Arizona)
W74-04136

GRAIN SORGHUM RESPONSE TO TRICKLE AND SUBSERFACE IRRIGATION,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
E. A. Hiler, and T. A. Howell.
Transactions of the ASAE (American Society of Agricultural Engineers), p 799-803, 1973. 5 fig, 3 tab, 18 ref.

Descriptors: *Irrigation efficiency, *Grain sorghum, *Subsurface irrigation, Irrigation water, Irrigation practices, Irrigation systems, Water utilization, Soil-water-plant relationships, Crops, Grains(Crops).
Identifiers: *Trickle irrigation.

Water use efficiencies are compared in a controlled-water experiment using intensified and conventional irrigation methods. The influence of reduction irrigation amounts on crop yields is evaluated for trickle irrigation. Trickle and mist irrigation resulted in highest water use efficiency of the methods tested. The intensified treatments were found to produce greater crop height and leaf area in grain sorghum crops. The water use efficiency of trickle irrigation methods was maximized by using small amounts of applied water. These results show that irrigation by trickle and subsurface techniques offer water use efficiencies compatible with arid land applications of these methods. (Muller-Arizona)
W74-04137

SEMI-PORTABLE SHEET METAL FLUME FOR AUTOMATED IRRIGATION,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
V. W. Uhl, Jr, and J. E. Garton.
Transactions of the ASAE (American Society of Agricultural Engineers), p 256-260, 1972. 7 fig, 7 ref.

Descriptors: *Irrigation systems, *Irrigation practices, *Irrigation engineering, *Flowmeters, *Flumes, Conveyance structures, Engineering structures, Hydraulic structures, Open channels, Water measurement.

A flume of sheet metal for automated cut-back irrigation is hydraulically and structurally designed. The optimum design determined is tested. Design considerations were ease of assemblage in the field, support of the channel in the field, and leakage. Manning's and relative roughness coefficients were determined experimentally. The final design obtained had a hydraulic cross-section compatible with practical use and construction. The structural frame of angular steel was found satisfactory. Orifice and weir calibration curves obtained compared favorably with published data. Bay construction was tested and compared to published information, and was found acceptable. In general, the sheet metal flume was found compatible with low cost construction and usage in irrigation projects such as those necessary for arid lands agriculture. (Muller-Arizona)
W74-04138

MOVEMENT OF NITRATES UNDER IRRIGATED AGRICULTURE,
Nebraska Univ., Lincoln. Coll. of Engineering and Architecture.
For primary bibliographic entry see Field 5B.
W74-04139

EFFECT OF IRRIGATION FREQUENCY ON THE AVERAGE EVAPOTRANSPIRATION FOR VARIOUS CROP-CLIMATE-SOIL SYSTEMS,
Universidad Catolica de Chile, Santiago. Departamento de Edafologia.
A. L. Norero, J. Keller, and G. L. Ashcroft.
Transactions of the ASAE (American Society of Agricultural Engineer), p 662-666, 1972. 6 fig, 1 tab, 23 ref.

Descriptors: *Evapotranspiration, *Soil moisture, *Corn(Field), *Alfalfa, *Soil-water-plant relationships, Soil environment, Irrigation effects, Irrigation practices, Soils, Model studies, Mathematical models, Evaporation, Transpiration, Root zone.

Soil-plant-atmosphere form a single continuous system for the movement of water. The evaporation of water from plants is the result of interactions of all three components of the system, and cannot be characterized by any single one. To create conditions for better decisions in plant-water situations, working mathematical models can play an important role. In this investigation, two field crops, corn and alfalfa, were selected to study the effect of irrigation frequency on evapotranspiration, with the former evaluated by the influence of atmospheric evaporative demands on evapotranspiration with plants grown in 24 in. deep 20-gallon field lysimeters; the latter by establishing evapotranspiration of an established field crop of alfalfa, with an extensive 9 ft. deep root system, as a function of soil moisture potential. These experiments demonstrated rather extreme cases in terms of the irrigation frequency required to maintain a high evapotranspiration rate or relative productivity. It concludes that it is possible to take crop data obtained from a few field experiments and extend them to other climatic zones and/or field sites. It is also possible to group crops with similar leaf-root development relationships and draw inferences for a whole crop group from experiments conducted on only one crop within the group. (Muller-Arizona)
W74-04140

UPTAKE AND TRANSLOCATION OF SR BY ZEA MAYS,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 5C.
W74-04187

DROUGHT RESISTANCE OF PEAR VARIETIES OF THE MAIN ECOLOGICAL-GEOGRAPHIC GROUPS, (IN RUSSIAN),
Vsesoyuznyi Institut Rastenievodstva, Leningrad (USSR).
A. G. Pruss.
Dokl Akad S-Kh Nauk. 11. p 14-15. 1972.
Identifiers: *Drought resistance, Ecological studies, *Pear varieties, *USSR, Arid lands, Semi-arid lands.

The classification of more than 100 pear varieties according to degree of drought resistance makes possible a more rational introduction of varieties for purposes of increasing productivity in arid and semiarid regions of the USSR.--Copyright 1973, Biological Abstracts, Inc.
W74-04220

MICROFLORA OF NUTRIENT SOLUTION IN SOILLESS GROWING OF VEGETABLE CROPS, (IN RUSSIAN),
Institut Fiziki, Krasnoyarsk (USSR).
L. S. Tirranen, and M. S. Rerberg.
Izv Sib Otd Akad Nauk SSSR Ser Biol Med Nauk. 3 p 68-72. 1972, (English summary).
Identifiers: Bacterium, Chromobacterium, Flora, Growing, Microflora, Mycobacterium, Nutrients, *Pseudomonas, Soilless growing, *Vegetable crops, *Microorganisms.

The microflora consisted mainly of Pseudomonas, Bacterium, Mycobacterium and Chromobacterium. Pseudomonas was predominant. The number of microorganisms increased with time.--Copyright 1973, Biological Abstracts, Inc.
W74-04235

EFFECT OF WEATHER CONDITIONS ON SPORULATION OF HELMINOTHOSPORIUM TURCICUM PASS,
Z. A. Volkvadze.
Mikol Fitopatol. Vol 6, No 6, p 536-537. 1972.
Identifiers: Air temperature, *Corn(Field), *Helminthosporium-turcicum, Humidity, *Sporulation, Weather conditions, Dew, *Fungi.

Experiments on corn demonstrated that the time during which dew remains on plants determines the rate of sporulation of H. turcicum. This process is accelerated with an increase of air temperature and humidity.--Copyright 1973, Biological Abstracts, Inc.
W74-04296

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

THE OPTIMAL EXPANSION OF A WATER RESOURCES SYSTEMS,
Texas Univ., Austin. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 6A.
W74-03754

AN EVALUATION OF URBAN FLOOD PLAINS,
For primary bibliographic entry see Field 6F.
W74-03756

ALASKA WATER RESOURCES RESEARCH NEEDS FOR THE 70'S.
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 6B.
W74-03757

ILLINOIS STORM SEWER SYSTEM SIMULATION MODEL: USER'S MANUAL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-03763

WATER RESOURCES NEWSLETTER, JUNE 1973.
Australian Water Resources Council, Canberra.
Water Resources Newsletter (Australia Government Publishing Service, Canberra, No 20, June 1973. 120 p.

Descriptors: *Water resources, *Australia, *Projects, *Publications, *Reviews, Environmental control, Sedimentation, Data collections, Water quality control, Watershed management, Surface waters, Groundwater resources, Hydrogeology, Model studies, Hydrology, Hydrologic data, Flood control, Water supply, Water demand, Conferences.

The Water Resources Newsletter, issued twice a year in June and December, is authorized by the Australian Water Resources Council (AWRC). It is compiled from information received from AWRC organizations and other sources by the AWRC Secretariat, Water and Soil Resources Division, Department of the Environment and Conservation, Canberra. Data and information are presented under the following main topics: water management and development; water quality management; sedimentation; groundwater studies; hydrology; meetings, symposia, conferences, courses; films and publications; personal news; and functions of council and its committees. AWRC and other publications are listed. (Woodard-USGS)
W74-03774

UPSLOPE EROSION ANALYSIS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2J.
W74-03799

FLOOD PROFILES IN THE UMPQUA RIVER BASIN, OREGON, PART 2,
Geological Survey, Portland, Oreg.
E. A. Oster.
Open-file report, 1973. 113 p, 85 fig, 8 tab, 3 ref.

Descriptors: *Flood profiles, *Flood frequency, *Flood data, *Land development, *Oregon, Flood plains, Flood plain zoning, Hydrologic data, Gaging stations, Streamflow, Flood peak, Low flow, Correlation analysis, Flow characteristics, Backwater, Reviews, Data collections, Evaluation, Watershed management, Flood forecasting.
Identifiers: *Umpqua River basin(Oreg).

Flood elevations for the selected reaches of the Umpqua River basin, Oregon, are presented in graphic and tabular form. To give a concept of range in stage, a low-water profile is included. The profiles presented are in reasonably good agreement with documented high-water marks and stage-discharge relations defined by current meter. This study was made at the request of Douglas County to develop profiles for the 10-, 25-, 100-, and 500-year floods and the December 1964 flood. This report is the second of three reports that will cover approximately 300 miles of Umpqua River basin streams. The reaches covered by this report are: Umpqua River from Scottsburg upstream to Hubbard Creek, and North Umpqua River from Winchester Dam upstream to Idleyld Park. (Woodard-USGS)
W74-03803

FLOODS IN IOWA: TECHNICAL MANUAL FOR ESTIMATING THEIR MAGNITUDE AND FREQUENCY,
Geological Survey, Iowa City, Iowa.
O. G. Lara.
Iowa Natural Resources Council Bulletin No 11, March 1973. 56 p, 20 fig, 8 tab, 16 ref, append.

Descriptors: *Flood frequency, *Flood forecasting, *Iowa, Streams, Methodology, Regression analysis, Hydrologic data, Equations, Topography, Flood peak, Mathematical models, River basins, Physical properties.
Identifiers: Unregulated natural streams.

Techniques and procedures for estimating the probable magnitude and frequency of floods on Iowa streams include instructions, equations, and graphs in a concise form. The estimating equations are based on regional relations between floods of spcific return periods and selected basin characteristics. The size of the drainage area and the slope of the stream channel are the most important factors that influence flood peaks in Iowa. It was necessary to subdivide the State into two hydrologic regions. Region I covers about 68% of the land surface of Iowa, and Region II covers most of that area described by Ruhe, (1969), as the Des Moines lobe. Within each region, regression equations have been developed which relate peak discharges of 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals to basin characteristics. The range in drainage area size varied from 0.33 to 14,038 square miles, and the slope from 1.31 to 100 feet per mile. The flood formulas were derived from data for unregulated natural streams. Therefore, they are not applicable to streams draining urban areas or basins affected by manmade controls. (Woodard-USGS)
W74-03805

WATER RESOURCES OF THE NORTHERN CHEYENNE INDIAN RESERVATION AND ADJACENT AREA, SOUTHEASTERN MONTANA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-03809

FLOODS OF THE 1970 AND 1971 WATER YEARS IN MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 2E.
W74-03816

DEWATERING OF THE CLAYTON FORMATION DURING CONSTRUCTION OF THE WALTER F. GEORGE LOCK AND DAM, FORT GAINES, CLAY COUNTY, GEORGIA,
Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 4B.
W74-03819

STATEMENT OF PROGRESS ON INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA,
Geological Survey, Huron, S. Dak.
L. D. Becker.
Open-file report, November 1973. 20 p, 1 fig, 4 ref.

Descriptors: *Flood frequency, *Flood forecasting, *South Dakota, Road construction, Culverts, Highways, Design criteria, Hydrologic data, Streamflow, Flood peak, Topography, Physicial properties, Data collections, Project purposes, Planning, Reviews, Evaluation.

A research study was initiated in 1967 to obtain information on the shape of flood hydrographs, climatic factors, and physiographic conditions affecting floods in South Dakota. The design of highway structures requires a knowledge of the magnitude and frequency of peak discharges expected at a given site. Information concerning the characteristic shape of flood hydrographs is also necessary if storage is to be considered as a factor in the design of culverts in highway embankments. Progress is summarized for the first 6.25 years of the 10.5-year research study. An extensive data collection network has been designed, instrumented, and is being operated. Concurrent records of precipitation and streamflow are being obtained for use in a rainfall-runoff model. Data being collected are considered both suitable and adequate for project needs. (Woodard-USGS)
W74-03821

AUTOMATIC CONTROL OF LEVEL, PRESSURE, AND FLOW,
Cla-Val Co., Newport Beach, Calif. Commercial Sales Div.
For primary bibliographic entry see Field 8C.
W74-03861

FIELD SHELTERBELT AFFORESTATION AND GREENERY PLANTING,
For primary bibliographic entry see Field 3F.
W74-03883

SYSTEMS SIMULATION OF ECONOMIC FACTORS AND THEIR RELATION TO THE WATER SYSTEM OF WYOMING'S PLATTE RIVER BASIN,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 6A.
W74-03892

SEQUENTIAL STOCHASTIC OPTIMIZATION FOR RESERVOIR SYSTEM,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
T. E. Croley, II.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Proceedings paper No 10263, p 201-219, January 1974. 5 fig, 7 tab, 22 ref. NSF GK-11564.

Descriptors: *Reservoir operation, Water resources, Hydraulics, *Stochastic processes, *Optimization, *Dynamic programming, Costs, Simulation analysis, Monte Carlo method, Statistical methods, Methodology, Mathematical models, Systems analysis, *Alternative water use.
Identifiers: Computation, Reduction, Data acquisition.

Considered is the practical application of stochastic optimization techniques to problems of finding optimum operations sequentially for reservoir systems. There is need for a sequential technique which surmounts the difficulties associated with present-day stochastic optimization methods. Existing techniques are reviewed, associated problems identified, and an alternative sequential which overcomes these problems is suggested; this alternative is then illustrated and compared to existing techniques using a hypothetical example. Feasible use of the alternate is possible since observations on planning horizons are employed in computation reduction. For a simple reservoir system, the techniques are applied and compared. Results show that computation costs were reduced and system performance was improved with the use of the alternate. (Bell-Cornell)
W74-03914

PYRAMID LAKE RECREATION DEVELOPMENT PLAN. INITIAL FACILITIES,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6B.
W74-03955

LOS BANOS RESERVOIR RECREATION DEVELOPMENT PLAN,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6B.
W74-03956

A BILL TO AUTHORIZE EXTENSIONS OF THE AMERICAN CANAL AT EL PASO, TEXAS.
For primary bibliographic entry see Field 6E.
W74-03986

DISCHARGE SYSTEM FOR THE A.D. EDMONSTON PUMPING PLANT,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 3B.
W74-04038

A BRIEF WATER-RESOURCES APPRAISAL OF THE TRUCKEE RIVER BASIN, WESTERN NEVADA,
Geological Survey, Carson City, Nev.
A. S. Van Denburgh, R. D. Lamke, and J. L. Hughes.
Nevada Division of Water Resources, Water Resources--Reconnaissance Series Report 57, 1973. 122 p, 6 fig, 1 plate, 9 photo, 24 tab, 51 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Water quality, *Nevada, Hydrologic data, Data collections, Hydrology, Water utilization, Streamflow, Runoff, Lakes, Hydrogeology, Water wells, Aquifer characteristics, Water yield, Water level fluctuations, Water analysis, Chemical analysis, Water types, Water supply.
Identifiers: *Truckee River basin(Nev).

The study area for this water-resources appraisal in Nevada lies at the western edge of the Great Basin and encompasses 12 hydrographic areas but excludes the Lake Tahoe basin. Eleven of the areas are part of the Truckee River drainage basin, and the 12th, the Fernley area, borders the basin to the east. Altitudes in the study area range from 10,778 feet atop Mt. Rose to 3,460 feet at the deepest point in Pyramid Lake (depth, 335 feet). Precipitation averages 5 to 10 inches per year at lower altitudes, and more than 40 inches in the higher mountain areas. Within the Truckee River basin in 1969, 43,000 acre-feet of water was withdrawn for domestic, public-supply, and industrial use. About 70% of the total is obtained from the Truckee River and Hunter Creek. The remainder, about 12,000 acre-feet per year, is pumped from wells. The greatest groundwater withdrawal is made to supply the Reno-Sparks municipal system. Groundwater ranges from dilute (specific conductance less than about 600 micromhos, dominated by calcium, sodium, and bicarbonate) in and near recharge areas and near streams, to saline (more than 5,000 micromhos, dominated by sodium and chloride) in the lowest, downgradient areas. The quality of surface waters deteriorates in a downstream direction, culminating in the saline waters of Pyramid Lake (about 5,000 mg per liter of dissolved solids) and Fernley Sink (more than 50,000 mg per liter). (Woodard-USGS)
W74-04047

SOIL MOISTURE TRENDS ON SAGEBRUSH RANGELANDS,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
For primary bibliographic entry see Field 2G.
W74-04074

FIRE CLIMATES IN THE SOUTHWEST,
Forest Service (USDA), Fort Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
M. A. Fosberg, and R. W. Furman.
Agricultural Meteorology, Vol 12, p 27-34, 1973. 3 fig, 1 tab, 7 ref.

Descriptors: *Phenology, *Moisture availability, *Arid climates, *Burning, *Forest fires, Forest management, Dry seasons, Drying, Seasonal, Range management, Range grasses, Brushlands, *Arizona, *New Mexico, Southwest U.S.

The climates of the arid southwestern states of Arizona and New Mexico were examined in terms of forest and range fire behavior. Mean equilibrium moisture content during the season of high fire danger was defined in terms of temperature and humidity. Phenological stages of the lesser herbaceous vegetation were used to evaluate the moisture content of the fine fuel complex which influences fire behavior, and were taken as integrators of available moisture. Climatological boundaries were primarily defined by marked transition in the equilibrium moisture content field. The secondary delineator used was the time-space domain of the fine fuel moisture complex. Such techniques are currently employed by fire control and weather agencies to evaluate fire potential in the study region. (Muller-Arizona)
W74-04130

CULVERTS FOR FLOW MEASUREMENT IN IRRIGATION SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
G. V. Skogerboe, W. R. Walker, and V. S. Boonkird.
Transactions of the ASAE (American Society of Agricultural Engineers), 1973, p 287-293. 8 fig, 2 tab, 9 ref.

Descriptors: *Discharge measurement, *Flow measurement, Structures, *Culverts, *Irrigation canals, *Lateral conveyance structures, Irrigation water, Irrigation efficiency, Conduits, Flumes, Flowmeters, Flow, Weirs.

The submerged flow analysis used for flow measuring flumes and weirs can be applied to free surface outlet control flow in culverts. Discharge ratings for horizontal culverts can be presented graphically on a single plot. Inlet control, free surface outlet control, and submerged outlet control conditions are investigated and presented in this graphic form. The result concludes that culverts may feasibly be used as flow-measuring structures in irrigation systems. This implies existing culverts may be used to make discharge measurements, and that small portable culverts may be similarly employed. This has applications in arid regions where agriculture is dependent on irrigation and where irrigation water is transported in culverts rather than pipes. (Muller-Arizona)
W74-04131

SEMI-PORTABLE SHEET METAL FLUME FOR AUTOMATED IRRIGATION,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-04138

HYGIENIC EVALUATION OF A MACHINE FOR APPLYING GRANULATED HERBICIDES IN CANALS OF THE COLLECTOR-DRAINAGE NETWORK, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
For primary bibliographic entry see Field 5G.
W74-04166

DRAINAGE DESIGN AS INFLUENCED BY CONDITIONS IN THE VICINITY OF THE DRAIN LINE,
California Univ., Davis. Dept. of Water Science and Engineering.
J. N. Luthin.
Completion Report UCAL-WRC-W-112, February 1972, 2 p, 1 ref. OWRR A-031-CAL(2).

Descriptors: *Design, *Pipes, *Drainage, *Drains, Flow, Soils, Gravel.

An experimental study of the effect of various drain parameters on the flow into the drain was completed. The experiments indicate a much larger effect of drain diameter on flow into drains that previous theoretical considerations. Doubling the drain diameter gave a 35-60 percent increase while tripling the drain diameter gave a 90-130 percent increase. Decreasing the pipe segment length from three feet to one foot increased the rate of flow more than 2-1/2 times. In the case of a pipe wrapped with fiberglass the increase was about 50 percent. Tests made of placing the drain holes on top or in the bottom of the drain pipe indicate that there is no effect in the flow if allowance is made for the change in hydraulic head drop. Tests made of a drain running empty, 1/4 full or 1/2 full failed to find any effect of water level in the drain except as it affects the hydraulic head. The second experiment measured the movement of various soil materials into gravel envelopes of various materials. Single-sized separates rates such as pea gravel, etc., are not effective in preventing the movement of fine sands and silts into drain lines. Gravel envelopes should not contain materials smaller that a No. 40 sieve since these small particles will move into the drain lines. A gravel envelope containing an appreciable amount of particles between the 10 and 40 sieve will probably prevent the movement of fine sands and silt. Particles larger than No. 10 apparently reduced the effectiveness of the envelope. Field soils containing clay and having good natural structure do not require an envelope since the cohesive forces greater than the seepage forces.
W74-04200

WATER RESOURCES OF WISCONSIN, ST. CROIX RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-04275

4B. Groundwater Management

WATER BALANCE OF A SMALL LAKE IN A PERMAFROST REGION,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 2H.
W74-03758

WATER RESOURCES OF THE NEW JERSEY PART OF THE RAMAPO RIVER BASIN,
Geological Survey, Washington, D.C.
J. Vecchioli, and E. G. Miller.
Available from Sup Doc, GPO Washington, D.C. 20402, Price $2.20. Water-Supply Paper 1974, 1973. 77 p, 29 fig, 4 plate, 4 tab, 30 ref.

Descriptors: *Water resources, *Groundwater resources, *Surface waters, *Water resources development, *New Jersey, Aquifer characteristics, Hydrology, Water wells, Well data, Pumping, Water yield, Hydrogeology, Groundwater recharge, Runoff, Streamflow, Water quality, Water temperature.
Identifiers: *Ramapo River basin(N.J.).

The Ramapo River, a major stream in the Passaic River basin, drains an area of 161 square miles, 70% of which is in Orange and Rockland Counties, N.Y., and 30% is in Bergen and Passaic Counties, N.J. The hydrology of the New Jersey part of the basin is described and the feasibility of developing large groundwater supplies from the stratified drift in the Ramapo River valley by inducing recharge to the aquifer from the river is evaluated. Data include construction features and yield characteristics of wells, chemical quality of ground and surface water, streamflow variability, lithology of the valley fill, groundwater withdrawals, and the effect of groundwater pumpage on streamflow. Small domestic supplies of groundwater can be obtained nearly everywhere, but the Brunswick Formation is the only consolidated-rock aquifer in the basin that can be depended upon to yield 100-200 gallons per minute to wells. Supplies of more than

1,000 gpm are available from wells tapping the stratified drift in the Ramapo valley. The drift supplies 75% of the groundwater pumped for public supply in the basin. (Woodard-USGS)
W74-03806

WATER-LEVEL DECLINES AND GROUNDWATER QUALITY, UPPER BLACK SQUIRREL CREEK BASIN, COLORADO,
Geological Survey, Denver, Colo.
D. L. Bingham, and J. M. Klein.
Colorado Water Resources Circular 23, 1973. 21 p, 7 fig, 2 plate, 3 tab, 12 ref.

Descriptors: *Groundwater resources, *Water quality, *Water level fluctuations, *Colorado, Hydrologic data, Hydrogeology, Water wells, Aquifer characteristics, Water yield, Withdrawal, Water utilization, Water analysis, Chemical analysis, Observation wells, Data collections, Watershed management.
Identifiers: *Black Squirrel Creek basin(Colo).

Groundwater resources are summarized for the alluvial aquifer of the upper Black Squirrel Creek basin in Colorado. Included are groundwater levels and groundwater quality data that were collected from 1970 to 1972, and selected data from previous studies. The alluvial aquifer consists of water-bearing gravel, sand, silt, and clay that occupies channels eroded in the underlying formations. Groundwater-level declines of 10 feet or more in a 15-square-mile area and declines of 20 to 35 feet over a 5-square-mile area have been observed in the alluvial aquifer during 1964-71. The saturated thickness of the aquifer exceeds 40 feet in about 40 square miles of the 350-square-mile basin. Present trends indicate a continued lowering of the water table. Water of good chemical quality, dissolved-solids concentration less than 250 mg per liter, underlies the central part of the basin. The dissolved-solids concentration increases laterally from the central part of the basin. (Woodard-USGS)
W74-03808

WATER AVAILABILITY AND GEOLOGY IN MARION COUNTY, ALABAMA,
Geological Survey of Alabama, University.
L. V. Causey, K. D. Wahl, P. Jefferson, and W. F. Harris, Jr.
Alabama Geological Survey Map 105, 1972. 31 p, 3 fig, 2 maps, 6 tab, 17 ref.

Descriptors: *Water resources, *Geology, *Alabama, *Surface waters, *Groundwater resources, Water quality, Hydrologic Data, *Maps, Data collections, Geological surveys, Aquifer characteristics, Water wells, Water yield, Hydrogeology, Streamflow, Average flow, Low flow, Water storage, Water utilization, Chemical analysis, Well data.

Rocks that crop out in the eastern part of Marion County in northwest Alabama include sandstones and shales of Mississippian and Pennsylvanian age that dip southward about 50 feet per mile. The sandstones are poor aquifers and expected yields are generally less than a quarter of a million gallons per day (mgd) per well. The western part of the county is underlain chiefly by sands and clays of Late Cretaceous age that dip southwestward about 25 feet per mile. The saturated sands will yield as much as 0.5 mgd per well. Streamflow is the principal potential source of large supplies of water in the county. The average runoff is about 850 mgd. The discharge of the Buttahatchee River, the largest stream, averaged 311 mgd at the gaging station below Hamilton during 1940-65. The annual minimum flows at that station ranged from 12 mgd to 36 mgd during the period 1951-65 and the median annual 7-day low flow was 30.4 mgd. Water from sandstone aquifers is generally hard and high in iron content; whereas water from unconsolidated sand aquifers is soft and locally high in iron content. Water from the streams is generally soft and low in mineral content. About 1.5 mgd of water is developed from aquifers and less than 1 mgd is developed from streams. (Woodard-USGS)
W74-03810

WATER AVAILABILITY IN MOBILE COUNTY, ALABAMA,
Geological Survey of Alabama, University.
P. C. Reed, and J. F. McCain.
Map 121. 1972. 45 p, 7 fig, 5 tab, 20 ref.

Descriptors: *Water resources, *Surface waters, *Groundwater resources, *Water quality, *Alabama, Hydrologic data, Hydrology, Basic data collections, Streamflow, Flow rates, Water wells, Aquifer characteristics, Hydrogeology, Well data, Water yield, Groundwater recharge, Water utilization, Water resources development, Water analysis.

Large quantities of water are available throughout Mobile County, Alabama. Annual rainfall is 64 inches; estimated runoff is 28 inches; and estimated groundwater recharge exceeds 12 inches 1 mgd or more per well. Alluvium and low terrace deposits in the Mobile River basin are potential sources of 0.5 to 1 mgd per well. The total average flow of streams that flow through Mobile County into Mississippi and those that discharge into Mobile Bay and Mississippi Sound is about 41,000 mgd. The Mobile River, largest source of surface water, has an average flow of 39,400 mgd and a median annual 7-day low flow of 7,750 mgd east of Mount Vernon. Groundwater is soft and low in dissolved solids except in areas adjacent to Mobile River, Mobile Bay, and Mississippi Sound. Generally surface water is soft and has a dissolved-solids content of less than 100 mg/liter except in areas affected by saltwater intrusion. The estimated average daily use of water in Mobile County in 1967 is 846 mgd. Of this, 805 mgd was surface water and 41 mgd was groundwater. (Woodard-USGS)
W74-03811

APPRAISAL OF GROUND-WATER AVAILABILITY AND MANAGEMENT PROJECTIONS, WALLA WALLA RIVER BASIN, WASHINGTON AND OREGON,
Geological Survey, Tacoma, Wash.
R. D. MacNish, D. A. Myers, and R. A. Barker.
Washington State Department of Ecology Water-Supply Bulletin No 37, 1973. 25 p, 14 fig, 3 ref.

Descriptors: *Groundwater resources, *Washington, *Oregon, *Aquifer characteristics, Water yield, Water wells, Water utilization, Irrigation, Hydrologic data, Hydrographs, Maps, Hydrogeology, Groundwater recharge.
Identifiers: *Walla Walla River basin.

The Walla River basin in southeastern Washington and northeastern Oregon covers about 1,750/square miles and is underlain by a basalt aquifer that yields water to wells at rates ranging from 30 to 3,000 gallons per minute. In the central lowland part of the basin, about 200 square miles of the basalt aquifer is overlain by a gravel aquifer that averages 200 feet in thickness and supplies water to wells at rates ranging from 5 to 900 gpm. There has been a sixfold increase in electrical-power comsumption by irrigators since 1950. The decline of water levels in the basalt aquifer at a rate of up to 15 feet per year in areas of heavy pumping is probably due mostly to the increasing rate of groundwater withdrawal from the basalt aquifer, rather than to the permanent removal of large quantities of water from storage. Although withdrawal of groundwater from the gravel aquifer is extensive, this aquifer is only lightly stressed and, with efficient management, could greatly increase its present annual yield of 75,000 acre-feet of water. Further withdrawal from the basalt aquifer is possible, although administrative restrictions on further development in the heavily pumped areas are likely. (Woodard-USGS)
W74-03812

GROUNDWATER DATA IN SANTA BARBARA AND SOUTHERN SAN LUIS OBISPO COUNTIES, CALIFORNIA, SPRING 1970 TO SPRING 1973,
Geological Survey, Menlo Park, Calif.
C. E. Lamb, and M. J. Mermod.
Open-file report, August 31, 1973. 131 p, 2 tab.

Descriptors: *Groundwater resources, *Water wells, *Water levels, *Water quality, *California, Basic data collections, Water level fluctuations, Water analysis, Chemical analysis.
Identifiers: *Santa Barbara County(Calif), *San Luis Obispo County(Calif).

This compilation is part of a continuing program to monitor the groundwater resources in and adjacent to Santa Barbara County, California. The purpose is to assist Santa Barbara County in its program of water management. Included in the compilation are water-quality and water-level data obtained during the period spring 1970 to spring 1973. Wells are listed in numerical order by township, range, and section. (Woodard-USGS)
W74-03814

COST ANALYSIS OF GROUNDWATER SUPPLIES IN THE NORTH ATLANTIC REGION, 1970,
Geological Survey, Washington, D.C.
D. J. Cederstrom.
Available from GPO, Washington, D.C. 20402 Price - 60 cents. Water-Supply Paper 2034, 1973. 48 p, 9 fig, 14 tab, 10 ref.

Descriptors: *Cost analysis, *Water costs, *Groundwater, *Northeast U.S., *Water supply, Water wells, Water utilization, Municipal water, Industrial water, Drilling, Well casings, Pipes, Well spacing, Aquifer characteristics, Pumping, Costs, Reviews.

Methods are presented for calculating costs of groundwater supplies for municipal and industrial uses from the various aquifers in the North Atlantic Region and the range in costs of the supplies. The capital cost of groundwater and the cost per thousand gallons in typical geologic and hydrologic environments are given in tabular form and graphs. The cost of municipal and industrial groundwater at the wellhead in the North Atlantic Region in 1970 generally ranged from 1.5 to 5 cents per thousand gallons. Water from crystalline rocks and shale is relatively expensive. Water from sandstone is less expensive. Costs of water from sands and gravels in glaciated areas and from Costal Plain sediments range from moderate to very low. In carbonate rocks costs range from low to fairly high. Data show the cost of water at the wellhead based on the average yield of several wells. The cost of water delivered by a well field includes costs of connecting pipe and of wells that have the yields and spacings specified. Cost of transport of water from the well field to point of consumption and possible cost of treatment are not evaluated. (Woodard-USGS)
W74-03815

DEWATERING OF THE CLAYTON FORMATION DURING CONSTRUCTION OF THE WALTER F. GEORGE LOCK AND DAM, FORT GAINES, CLAY COUNTY, GEORGIA,
Geological Survey, Atlanta, Ga.
J. W. Stewart.
Water-Resources Investigations 2-73, January 1973. 22 p, 13 fig, 1 tab, 7 ref.

Descriptors: *Dam construction, *Dewatering, *Groundwater, *Georgia, *Alabama, Aquifer characteristics, Groundwater movement, Trans-

missivity, Surface-groundwater relationships, Storage coefficient, Hydrogeology, Groundwater recharge, Drainage engineering.
Identifiers: Walter F. George Lock and Dam, *Chattahoochee River.

This reservoir is the largest manmade structure in the South and extends over 2.5 miles across the flood plain of the Chattahoochee River at Fort Gaines, Clay County, in southwest Georgia and in Henry County, in southeast Alabama. The multipurpose dam consists of two rolled-filled earth dikes, a concrete spillway, a single-stage lock with an 88-foot lift, and a 130,000 kilowatt capacity powerhouse. During dewatering, the potentiometric surface was lowered from a pre-pumping altitude of about 115 to 120 feet above msl to a minimum altitude of about 40 feet above msl, or near the bottom of the 'shell' limestone. The stage of the Chattahoochee River ranged from about 20 to 60 feet above the potentiometric surface at the dewatering sites. The Chattahoochee River seemingly is recharging the Clayton Formation near the damsite, possibly through large solution cavities such as were observed during construction of the spillway site at the river. Some underground leakage is expected to occur at the damsite because of the cavernous condition of the limestone, particularly on the Alabama side of the river. (Woodard-USGS)
W74-03819

THE HYDRAULICS OF ARTIFICIAL RECHARGE,
Technische Hogeschool, Delft (Netherlands).
L. Huisman.
Paper No 9 of Artificial Groundwater Recharge Conference, University of Reading, England, September 21-24, 1970, Vol 1: The Water Research Association, Marlow, England, p 223-262, June 1971. 33 fig, 2 tab, 4 ref.

Descriptors: *Artificial recharge, *Water spreading, *Recharge ponds, Infiltration, *Groundwater movement, Water treatment, Water quality, Hydraulics.
Identifiers: *The Netherlands.

The aquifers available for artificial recharge in the Netherlands are rather fine grained, with the 10% diameter passing between about 0.1 and 0.3 mm. Artificial recharge by injection was tried, but was a failure, the acceptance rate dropping to a few cu m per hr after a few months of service. Only surface spreading methods are used, with a combined capacity of about 120 million cu m per yr. The entrance velocity of the water into the subsoil varies from about 0.1 to 0.5 m per day. With better pretreatment, rates of 2 m per day with open ditches and 6 m per day with covered ditches (and no algae growth) are feasible. The detention time in the subsoil governs the improvement in water quality by self-purification as well as by mixing. With the existing schemes, minimum detention times are about 4 weeks. When the length of travel in the subsoil is so small (less than 50 m for instance) short circuiting can cause the minimum detention time to become dangerously low. Periods of interrupted supply, due to an insufficient quantity or quality of the river water, pollution of this water, or a break in the pipeline carrying the water from the river to the recharge area, vary from 1 to 3 months. (Knapp-USGS)
W74-03820

BOREHOLE RECHARGE: THE COMPATABILITY OF RECHARGE WATER WITH THE AQUIFER,
California Univ., Davis. Dept. of Civil Engineering.
R. B. Krone.
Paper No 10 of Artificial Groundwater Recharge Conference, University of Reading, England, September 21-24, 1970, Vol 2: The Water Research Association, Marlow, England, p 263-277, June 1971.

Descriptors: *Artificial recharge, *Injection wells, *Water quality, *Clogging, Aquifer characteristics, Permeability, Water chemistry, Boreholes, *Dissolved solids.

For waters to be recharged through wells, the dissolved gas concentrations should be less than the saturation concentrations at temperatures and pressures that will occur in the aquifer. Aeration should be avoided and the recharge water temperature should be the same or greater than that of the aquifer. The dissolved solids concentration should be such that a sodium adsorption ratio less than 3 and as low as is feasible be maintained, and the concentrations of dissolved substances should be suitable for the most sensitive use at the discharge sites. Precipitation of compounds resulting from combination of recharge water and aquifer water should be avoided. The suspended solids concentration should be as low as is attainable. The recharge waters should be chlorinated to minimize biological growths. While these requirements are restrictive, they are justified in most cases by the high permeability necessary for a satisfactory well, by the high costs of constructing recharge wells, and by the uncertain results of clogged well rehabilitation. (Knapp-USGS)
W74-03822

PILOT SCALE INVESTIGATIONS OF WELL RECHARGE USING CORED SAMPLES,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5D.
W74-03823

CLOGGING IN RECHARGE WELLS, CAUSES AND CURES,
Geological Survey, Little Rock, Ark.
R. T. Sniegocki, and R. F. Brown.
Paper No 13 of Artificial Groundwater Recharge Conference, University of Reading, England, September 21-24, 1970, Vol 2: The Water Research Association, Marlow, England, p 337-357, June 1971. 2 fig, 11 ref.

Descriptors: *Artificial recharge, *Injection wells, *Clogging, *Water quality, Water treatment, Silting, Turbidity, Chemical reactions, Air entrainment, Aquifer characteristics, *Pre-treatment(Water).

Artificial recharge of surface water to groundwater storage is a valuable water management tool. Injection of water into aquifers through wells has generally resulted in partially clogging the aquifer. The clogging is due to air entrainment, the presence of suspended material, the growth of micro-organisms, or the chemical incompatibility of the injected water with the aquifer environment. A clogged recharge well generally can be redeveloped to some degree through the use of chemicals and backflushing. However, pretreatment of the injected water to remove suspended material and make it chemically compatible with the aquifer environment will minimize clogging and promote preservation of the aquifer. (Knapp-USGS)
W74-03824

GROUNDWATER RECHARGE FOR WASTE WATER RECLAMATION AND/OR STORAGE OF SUPPLIES: A COST COMPARISON WITH CONVENTIONAL METHODS,
Asian Inst. of Tech., Bangkok (Thailand).
For primary bibliographic entry see Field 5D.
W74-03825

THE FUTURE PROSPECTS OF ARTIFICIAL GROUNDWATER RECHARGE,
California Univ., Berkeley.
For primary bibliographic entry see Field 5D.
W74-03826

THE EFFECT OF FLUX AND GRAVITATIONAL FORCES ON MISCIBLE DISPLACEMENT IN A THIN HOMOGENEOUS BED,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 2F.
W74-03896

GROUND-WATER HYDRAULICS IN AQUIFER MANAGEMENT,
Stanford Univ., Calif. Dept. of Geology.
E. Aguado, and I. Remson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY1, Proceedings paper No 10287, p 103-118, January 1974. 3 fig, 4 tab, 8 ref.

Descriptors: *Aquifer management, *Linear programming, *Hydraulics, *Groundwater, *Methodology, Optimization, Constraints, Physics, Flow, Equations, Mathematical models, Systems analysis.
Identifiers: *Finite differences.

Several authors have advocated incorporating the physics of aquifers into groundwater management models. A method is presented which attempts to include groundwater variables directly as decision variables in linear programming management models; thus finite-difference approximations of the governing differential equations become constrains in the LP formulation. The methodology first replaces the differential equations of groundwater flow by finite-difference approximations that include unknown sink/source terms. The resulting system of algebraic linear equations has a rectangular matrix of coefficients. This system, together with linear inequalities relating sink/source terms, heads or both, and together with an objective function, forms a linear programming model. The method is applied to small-scale models of confined and unconfined saturated flow for steady-state and transient cases. The steady-state LP models are solved using available computer codes. For the transient confined model, the Crank-Nicolson scheme is used, and a single LP problem is solved covering all of the time steps. For the transient unconfined model, a predictor technique is used, and a LP problem is solved at each corrector step. The optimal solutions are consistent with the results of traditional analyses. The method seems to be useful for studying the physical behavior of a groundwater system as some economic or management goal is achieved by the optimizing of some linear function of the variables. (Bell-Cornell)
W74-03913

THE GROUND-WATER DEPLETION ALLOWANCE UNDER THE FEDERAL INCOME TAX,
Kansas State Univ., Manhattan. Dept. of Economics.
For primary bibliographic entry see Field 6E.
W74-03962

LOOKING FOR POLLUTION UNDER THE EARTH,
For primary bibliographic entry see Field 5B.
W74-04004

A BRIEF WATER-RESOURCES APPRAISAL OF THE TRUCKEE RIVER BASIN, WESTERN NEVADA,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 4A.
W74-04047

HYDROGEOLOGY OF THE PRINCIPAL AQUIFERS IN SULLIVAN AND GREENE COUNTIES, INDIANA,
Geological Survey, Indianapolis, Ind.
For primary bibliographic entry see Field 2F.

W74-04049

EFFECTS ON WATER QUALITY IN THE SHALLOW AQUIFER DUE TO THE OPERATION OF THE CROSS STATE DUMP, PALM BEACH COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-04052

ENCYCLOPEDIC DICTIONARY OF EXPLORATION GEOPHYSICS,
Chevron Oil Co., Houston, Tex. Geophysical Div.
For primary bibliographic entry see Field 8B.
W74-04142

A GENERAL PRESSURE BUILDUP THEORY FOR A WELL IN A CLOSED DRAINAGE AREA,
Stanford Univ., Calif.
For primary bibliographic entry see Field 8B.
W74-04144

TRANSIENT PRESSURE TESTING OF FRACTURED WATER INJECTION WELLS,
Pan American Petroleum Corp., Tulsa, Okla.
For primary bibliographic entry see Field 8G.
W74-04147

EFFECT OF ADJACENT EXPANSIBLE FLUIDS AND CAPROCK LEAKAGE ON BUILDUP AND DRAWDOWN BEHAVIOR OF WELLS IN AN AQUIFER,
Michigan Univ., Ann Arbor.
M. C. Miller, M. R. Tek, and D. L. Katz.
Society of Petroleum Engineers Journal, Vol 6, No 3, p 239-246, September, 1966. 12 fig, 11 ref.

Descriptors: *Permeability, *Aquifer characteristics, *Leakage, *Compressibility, Diffusivity, *Drawdown, Porous media, Reservoir, Storage coefficient, Darcy's law.
Identifiers: Caprock leakage, Expansible fluids, Constant-pressure boundary.

Methods of determining in situ reservoir properties from drawdown or buildup tests on wells are extended to include the effects of adjacent expansible fluids or caprock leakage. Such problems are met in examining the behavior of wells in an aquifer adjacent to an unknown gas field, or adjacent to a gas storage reservoir. Similar deviations from the expected analytical results may result from leakage through a caprock. A quantitative evaluation is made of increases in the indicated compressibility and permeability caused by the presence of an expansible fluid as a function of the distance between the pumping and the observation well and the distance between the pumping well and the expansible fluid (as a line of constant pressure). The influence of leakage through the caprock from a constant pressure source upon indicated in situ properties is given as a function of the permeability and thickness of the caprock. (Gray-NWWA)
W74-04152

EFFECTS OF PUMPING FROM THE OHIO RIVER VALLEY ALLUVIUM BETWEEN CARROLLTON AND GHENT, KENTUCKY,
Geological Survey, Reston, Va.
D. V. Whitesides, and P. D. Ryder.
Kentucky Geological Survey, Information Circular 18, Series X, 1969. 20 p, 9 fig, 18 ref.

Descriptors: *Wells, *Groundwater, *Drawdown, *Infiltration, *Alluvial Aquifers, Pumping, *Kentucky, *Ohio River, Industrial water, Water demand.
Identifiers: Induced infiltration.

Total storage of ground water in the alluvial aquifer in the Carrollton-Ghent, Kentucky area is limited because of the moderate thickness and relatively small areal extent of the aquifer. Recent industrial expansion coupled with increased ground water withdrawals in the area caused water levels to decline as much as 30 feet from 1968 to mid-1969. Water levels in areas remote from centers of heavy pumping are about normal and fluctuate seasonally. Total amount of ground water available for withdrawal in the Carrollton-Ghent area is about 10.5 billion gallons. Total pumpage from closely spaced industrial wells is about 14 million gallons per day, resulting in excessive drawdown in localized pumping areas. Induced infiltration from the Ohio River has sustained yields of several million gallons per day in similar areas. Accurate knowledge of induced filtration characteristics at each heavily pumped area is lacking. This knowledge and proper location of wells near and parallel to the river would help solve the problem of insuring an adequate water supply without excessive drawdown in this area. (Staplin-NWWA)
W74-04155

FARM GROUND WATER NITRATE POLLUTION - A CASE STUDY,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5B.
W74-04158

EVALUATION OF GROUNDWATER RESOURCES IN LIVERMORE VALLEY, CALIFORNIA,
California Univ., Berkeley. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W74-04201

A NUMERICAL MODEL OF MULTIPHASE FLOW AROUND A WELL,
Institut Francais du Petrole, des Carburants et Lubrifiants, Rueil-Malmaison (France).
F. Sonier, P. Besset, and O. Ombret.
Society of Petroleum Engineers Journal, Vol 13, No 6, p 311-320, December 1973. 9 fig, 2 tab, 7 ref, append.

Descriptors: *Wells, *Drawdown, *Discharge(Water), *Oil fields, *Simulation analysis, Mathematical models, Numerical analysis, Model studies.
Identifiers: Multiphase flow.

A two-dimensional three-phase numerical model simulates two- or three-phase coning behavior in wells discharging water, oil, and gas. The model is fully implicit with respect to all variables and uses the simultaneous solution of the different equations describing multiphase flow. Particular attention is given to the well boundary condition, which is considered to be a physical boundary. The mathematical expression of these well conditions enables flow rates to be calculated in a perfectly implicit manner and thus makes the model very stable so that the computational error in time is very small. The results of several tests are presented. The model was checked by the simulation of several water coning cases that had previously been studied on a physical model. (Knapp-USGS)
W74-04258

EFFECTS OF THE FEEDER CANAL ON THE WATER RESOURCES OF THE FORT LAUDERDALE PROSPECT WELL-FIELD AREA,
Geological Survey, Miami, Fla.
For primary bibliographic entry see Field 5G.
W74-04259

WATER-MANAGEMENT STUDIES OF A STREAM-AQUIFER SYSTEM, ARKANSAS RIVER VALLEY, COLORADO,
Geological Survey, Pueblo, Colo.
O. J. Taylor, and R. R. Luckey.
Ground Water, Vol 12, No 1, p 22-38, January-February 1974. 9 fig, 3 tab, 9 ref.

Descriptors: *Surface-groundwater relationships, *Conjunctive use, *Alluvial channels, *Mathematical models, *Colorado, Water management(Applied), Phreatophytes, Reservoir operation, Planning.
Identifiers: *Arkansas River(Colo).

A mathematical model was developed and used to simulate the steam-aquifer system in the Arkansas River valley in southeastern Colorado, from Pueblo to the Colorado-Kansas State line. The model simulates the interrelations among groundwater and surface water including reservoirs, losses, and transmountain diversions, utilizing various water-distribution rules. The model was used to analyze 24 water-management plans designed to reduce shortages in the irrigation supply. One management plan simulated salvage of water from phreatophyte evapotranspiration, different reservoir operation regulations, use of imported groundwater and surface water, a new reservoir, additional groundwater use, and application of excess streamflow. The resulting annual dependable supply was increased from 610,000 acre-feet to 870,000 acre-feet in relation to an annual demand of 1,100,000 acre-feet. The model can be used as a tool to analyze other water-management plans. (Knapp-USGS)
W74-04262

WAT'S NEW IN DEEP-WELL INJECTION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5E.
W74-04265

BASE OF FRESH GROUND WATER (APPROXIMATELY 3,000 MICROMHOS) IN THE SAN JOAQUIN VALLEY, CALIFORNIA),
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-04274

WATER RESOURCES OF WISCONSIN, ST. CROIX RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-04275

4C. Effects On Water Of Man'S Non-Water Activities

INVESTIGATION OF THE EFFECTS OF URBANIZATION ON PRECIPITATION TYPE, FREQUENCY, AREAL AND TEMPORAL DISTRIBUTION, PHASE II,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Institute.
M. D. Shulman, and E. A. Brotak.
Availability from NTIS as PB-227 232 $4.00 in paper copy, $1.45 in microfiche. Technical Completion Report, October 1973. 83 p, 7 fig, 23 tab, 40 ref. OWRR B-044-NJ(3). 14-31-0001-3615.

Descriptors: *Precipitation(Atmospheric), *Meteorological data, *Rainfall disposition, *Weather patterns, *Temporal distribution, Rain, Local precipitation, Meteorology, Climatology, *Urbanization, Distribution patterns, *New York.
Identifiers: *Areal distribution, Markov chain analysis.

From a previous phase of research fifty years of daily precipitation values were available on tape for a network of 20 stations in the N.Y. metropolitan area. The earlier study showed that under certain wind conditions, precipitation augmentation was discerned downwind of the urban complex. However, the present study indicates that the urban area does not have any effect on daily precipitation patterns. Analyses were also made of probabilities of wet and dry periods of different lengths using the Markov chain probability model. These results will be valuable in many areas of planning, especially activity scheduling and economic risk taking. Also, the analysis of the average year at Hightstown gives an insight into the processes which govern precipitation patterns in this area. One of the major goals was accomplished with the establishment of a huge data bank with daily precipitation values for a network of stations. Many future analyses can now be run on these data, especially if data from other stations become available. (Shipple-New Jersey)
W74-03768

FLOW RESISTANCE OVER SHORT SIMULATED VEGETATION AND VARIOUS TALL SIMULATED VEGETATION GROUPINGS ON FLOW RESISTANCE AND SEDIMENT YIELD,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2E.
W74-03787

STATEMENT OF PROGRESS ON INVESTIGATION AND ANALYSIS OF FLOOD HYDROGRAPHS FROM SMALL DRAINAGE BASINS IN SOUTH DAKOTA,
Geological Survey, Huron, S. Dak.
For primary bibliographic entry see Field 4A.
W74-03821

EFFECTS OF DEICING CHEMICALS UPON GROUND AND SURFACE WATERS (INITIAL PROGRAM DEVELOPMENT),
Massachusetts Dept. of Public Works, Wellesley Hills. Research and Materials Section.
For primary bibliographic entry see Field 5B.
W74-04149

4D. Watershed Protection

FLOW RESISTANCE OVER SHORT SIMULATED VEGETATION AND VARIOUS TALL SIMULATED VEGETATION GROUPINGS ON FLOW RESISTANCE AND SEDIMENT YIELD,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2E.
W74-03787

LEVELS OF ASSESSMENT,
Upper Mississippi River Basin Commission, Twin Cities, Minn.
For primary bibliographic entry see Field 6B.
W74-04035

EXPERIENCES WITH THE CORRECTION OF DISORDERED STREAMS OF THE ALPINE TYPE, (IN ITALIAN),
P. Scategni.
Italy Minist Agric For Collana Verde. 25, p 1-287. 1971. Illus. (English summary).
Identifiers: *Alpine streams, Dams, *Erosion control, Forestation, Slopes, *Streams(Disordered), *Reforestation.

The following remedial measures are given: correction of the hydraulic profiles and gradients of the river valley in order to avoid erosion and slope instability of the sides of the valley; consolidation and rearrangement of existing unstable slopes; and reforestation of the largest surface of the basin, in order to slacken the speed of superficial and deep waters. The correction of the hydraulic profiles and gradients of the river valley can be obtained providing transversal retaining constructions like small dams designed for overtopping or crossbars.--Copyright 1973, Biological Abstracts, Inc.
W74-04276

ANTI-EROSIVE ROLE OF NATURAL PLANTS IN LOW FOOT-HILLS BORDERING THE FERGHANA BASIN, (IN RUSSIAN),
Tashkent Univ. (USSR).
O. Ismatov, and Kh. Azimov.
Uzb Biol Zh. Vol 16, No 1, p 39-41. 1972.
Identifiers: Artemisia, Barley, Basins, *Erosive control, Foothills, *Grasses, Phlomis, Poa-Bulbosa, Sedge, *USSR(Ferghana basin), *Vegetation establishment, *Plants(Long-rooted).

Using accepted geo-botanical methods 347 spp. of higher plants were found in this USSR locality, and were divided into 4 groups: log-rooted grasses, sedge and barley; Poa bulbosa; perennials, long-rooted plants and plants which send out root suckers (Artemesia, Phlomis); and predominantly biennials and annuals. The anti-erosive ability of these plants is described and discussed.--Copyright 1973, Biological Abstracts, Inc.
W74-04287

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

EFFECT OF POLYESTER FIBER PROCESSING EFFLUENTS ON WATER QUALITY,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
W. C. Tincher.
Availability from NTIS as PB-227 383 $3.75 in paper copy, $1.45 in microfiche. Completion Report ERC-1673, November 1973. 51 p, 16 fig, 5 tab, 26 ref. OWRR A-043-GA(1). 14-31-0001-3810.

Descriptors: *Georgia, Organic compounds, *Spectroscopy, Fluorescence, Waste water disposal, Waste water treatment, *Water quality, *Textiles, Dyes, Dye releases, *Industrial wastes, *Aromatic compounds, *Pollutant identification, Plastics, Water pollution sources.
Identifiers: *Biphenyl, Polyester textiles, Carpets, Luminescence.

This study evaluated the contribution of the aromatic hydrocarbons used in large quantities in processing polyester textile products to deterioration of water quality. Biphenyl, a chemical used in processing polyester carpet, received major attention due to the concentration of carpet processing in northeast Georgia. An analytical procedure for detecting biphenyl based on luminescence spectroscopy was developed. This procedure involved removal of organic compounds from water samples by cyclohexane extraction and measurement of the intensity of fluorescence emission at 310 nm with excitation at 265 nm. The procedure is capable of detecting biphenyl in water at concentrations less than 5 micrograms-per-liter. The concentrations found in effluents from plants treating spent carpet dyeing wastes suggest that biphenyl content is little affected by differences in the degree of treatment ranging from none to secondary treatment in municipal plants. Biphenyl concentration decreases rapidly downstream with volatilization into the atmosphere being the most probable loss mechanism. Water samples containing biphenyl were subjected to conditions expected to exist during chlorination of waste treatment plant effluents, and no evidence of conversion of biphenyl to chlorinated species was found. Luminescence studies on water samples from a number of Georgia streams (including municipal water supplies) revealed several organic compounds besides biphenyl. Fluorescence and phosphorescence spectroscopic studies provide an excellent means for detection, identification, and quantification of these organic contaminants.
W74-03761

CATION ADSORPTION AND DESORPTION RATES IN NATURAL WATER STUDIES,
Montana State Univ., Bozeman. Dept. of Chemistry.
G. K. Pagenkopf.
Availability from NTIS as PB-227 237 $3.00 in paper copy, $1.45 in microfiche. Montana University Joint Water Resources Research Center, Montana State University, Bozeman, Report No 45, December 1973. 14 p, 6 fig, 3 tab. OWRR A-057 MONT(1).

Descriptors: *Ion exchange, *Cation adsorption, *Cathodes, *Electrochemistry, Natural streams, Heavy metals, Cadmium, Calcium, Electrodes, Monitoring, Pollutant identification.
Identifiers: *Calcium ION, Hydrous iron oxide, Adsorbed heavy metals, *Ion selective electrodes.

The adsorption of calcium ion onto hydrous iron oxide was investigated. The adsorption and desorption rates are fast, thus indicating that hydrous oxide surfaces act as metal ion buffering agents in natural water systems. Competitive adsorption studies indicate that calcium ion can displace adsorbed heavy metals such as cadmium. The applicability of a calcium ion selective electrode to environmental monitoring was also investigated. The electrode is subject to interference from phenolic type compounds and thus not suitable for use in waters where these compounds may be present. (Williams-Montana)
W74-03765

PRECIPITATION AS A NUTRIENT AND HYDROGEN ION SOURCE FOR FORESTED WATERSHEDS IN THE MISSOULA VICINITY,
Montana Univ., Missoula. School of Forestry.
For primary bibliographic entry see Field 5B.
W74-03766

A FEASIBILITY STUDY OF A RESEARCH PROGRAM ON THE SOURCE, DEGRADATIVE REMOVAL AND SECONDARY CONSEQUENCES OF PETROLEUM PRODUCTS IN WATER,
New Hampshire Univ., Durham. Dept. of Chemistry.
K. K. Anderson, P. R. Jones, G. G. Lyle, R. E. Lyle, and C. W. Owens.
Availability from NTIS as PB-227 240 $3.00 in paper copy, $1.45 in microfiche. University of New Hampshire, Durham, Water Resources Research Center, Final Report, November 1973. 4 p. OWRR A-033-NH(1). 14-31-0001-3829.

Descriptors: *Gasoline, *Oil pollution, *Organic compounds, Aqueous solutions, Gas chromatography, Separation techniques, *Pollutant identification, *New Hampshire.
Identifiers: *Lake Pawtuckaway(NH).

This feasibility study concentrated on the detection of hydrocarbons in lake water and in water artificially contaminated with gasoline. The analytical procedure described easily detected 1 ppm of gasoline in freshly prepared aqueous solutions. Water from Lake Pawtuckaway was analyzed. Only slight traces of material, presumably hydrocarbon in nature, were detected. It is estimated that these contaminants were present at roughly 10 ppb. A final attempt at detecting hydrocarbon residues was made. Fish grown in water with and without hydrocarbon contaminants

were analyzed for hydrocarbons using an extraction procedure designed in conjunction with gas chromatographic system. It was hoped that the fish might concentrate certain hydrocarbon contaminants in effect multiplying the sensitivity of the analytical techniques. No differences in extracts from the two fish were observed.
W74-03767

APPLICATION OF REMOTE SENSING TO RIVER MECHANICS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-03800

WATER RESOURCES OF THE NEW JERSEY PART OF THE RAMAPO RIVER BASIN,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-03806

WATER-LEVEL DECLINES AND GROUND-WATER QUALITY, UPPER BLACK SQUIRREL CREEK BASIN, COLORADO,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 4B.
W74-03808

WATER RESOURCES OF THE NORTHERN CHEYENNE INDIAN RESERVATION AND ADJACENT AREA, SOUTHEASTERN MONTANA,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 7C.
W74-03809

WATER AVAILABILITY IN MOBILE COUNTY, ALABAMA,
Geological Survey of Alabama, University.
For primary bibliographic entry see Field 4B.
W74-03811

SELENIUM IN NEBRASKA'S GROUNDWATER AND STREAMS,
Geological Survey, Lincoln, Nebr.
For primary bibliographic entry see Field 5B.
W74-03813

GROUNDWATER DATA IN SANTA BARBARA AND SOUTHERN SAN LUIS OBISPO COUNTIES, CALIFORNIA, SPRING 1970 TO SPRING 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W74-03814

CHEMICAL QUALITY OF SURFACE WATER IN THE EASTERN OSWEGO RIVER BASIN, NEW YORK,
Geological Survey, Albany, N.Y.
W. J. Shampine.
New York Department of Environmental Conservation Basin Planning Report ORB-6, 1973. 100 p, 36 fig, 6 tab, 39 ref, append.

Descriptors: *Water quality, *Chemical analysis, *Surface waters, *New York, Streams, Lakes, River basins, Hydrologic data, Precipitation(Atmospheric), Streamflow, Flow rates, Runoff, Geology, Overland flow, Base flow, Sampling, Water analysis, Water chemistry, Geochemistry, Correlation analysis, Discharge(Water), Water pollution sources.
Identifiers: *Oswego River basin(N.Y.).

The Eastern Oswego River basin is an area of about 2,500 square miles in central New York. The basin may be subdivided into four regions characterized by surface water of distinctive chemical quality: Regions I (roughly the northern one-third of the basin), IIA (the southern one-third of the basin), and IIB (a triangular area in the northwestern corner of the basin) are characterized by calcium bicarbonate type water with average dissolved-solids contents of 80, 200, and 700 mg/liter, respectively; Region III (an east-west band across the central part of the basin) is characterized by calcium sulfate type water and a dissolved-solids content of about 700 mg/liter. Water from Regions I, IIA, and IIB is suitable for public and private supplies with little treatment. The more highly mineralized water from Region III, particularly in the Onondaga Lake area, including Syracuse, is unsuitable for most uses without treatment. (Woodard-USGS)
W74-03817

DISTRIBUTION OF ZR, TI, NI, CO, PB, CU, AND OTHER ELEMENTS IN THE SURFACE LAYER OF RECENT SEDIMENTS OF LAKE BALKHASH (RASPREDELENIYE ZR, TI, NI, CO, PB, CU I DRUGIHK ELEMENTOV V POVERKHNOSTNOM SLOYE SOVREMENNYKH OSA DKOV OZ. BALKHASH),
Adademiya Nauk SSSR, Moscow. Geologicheskii Institut.
For primary bibliographic entry see Field 2H.
W74-03827

BASIC TYPES OF RECENT BOTTOM SEDIMENTS OF THE MEDITERRANEAN SEA, THEIR MINERALOGY AND GEOCHEMISTRY (OSNOVNYYE TIPY SOVREMENNYKH DONNYKH OSADKOV SREDIZEMNOGO MORYA, IKH MINERALOGIYA I GEOKHIMIYA),
Adademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
For primary bibliographic entry see Field 2J.
W74-03828

LAKES OF THE BOL'SHOY PATOK RIVER BASIN (NORTHERN URALS). THEIR IMPORTANCE AND PRESERVATION (OZERA BASSEYNA R. BOL'SHOY PATOK (PRIPOLYARNYY URAL), IKH ZNACHENIYE I OKHRANA).,
For primary bibliographic entry see Field 2H.
W74-03832

IRON ORE IN LAKES OF VOLOGDA OBLAST (ZHELEZORUDNYYE OZERA VOLOGODSKOY OBLASTI),
For primary bibliographic entry see Field 2H.
W74-03833

TEST FOR ANTICHOLINESTERASE MATERIALS IN WATER,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
R. M. Gamson, D. W. Robinson, and A. Goodman.
Environmental Science and Technology, Vol 7, No 13, p 1137-1140, December 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Pollutant identification, *Methodology, *Organophosphorus compounds, *Water pollution, Water analysis, Organophosphorus pesticides, Phosphothioate pesticides, Hydrogen ion concentration, Pollutants, Water temperature, Enzymes, Chemical analysis, Chemical reactions.
Identifiers: *Enzymatic inhibitors, *Anticholinesterases, Horse serum cholinesterase, Detection limits, Sensitivity, Trace levels, Chemical indicators, Sarin, Parathion, Chromogenic reagents, Enzyme activity.

A simple device containing paper impregnated with cholinesterase is reported for detection of organophosphorus inhibitors in the ppb to ppm range in water. The device is a polypropylene 'ticket', 1 in. wide, 2 in. long, and 1/16 in. thick, round at one end, and square at the other. The round end is wetted with buffer (pH 8) and the substrate (2,6 dichloroindophenyl acetate in ligroine) is added from a dispenser. After a short waiting period, the round end is observed for blue color development which serves as a control for the presence or absence of enzyme activity. The appearance of the blue color indicates that the system is operating properly; it also means that a cholinesterase inhibitor is not present. No change in color is indicative of the presence of a hazard. Optimum performance is obtained at 20C and pH 8. Under these conditions, the enzyme is completely inhibited in 20 min or less by 10 ppb up to 1 ppm depending on the inhibitor. Comparison of inhibition data with rate constants indicates that the sensitivity of the device to any given inhibitor can be estimated if the rate constant value is known for that inhibitor with horse serum cholinesterase. Experimental data are presented on studies with the organophosphorus esters isoprophyl methylphosphonofluoridate (Sarin), O-ethyl S(2-diisopropylamino) ethyl methylphosphonothioate, and OO-diethyl O-p-nitrophenyl phosphorothioate (parathion). (Holoman-Battelle)
W74-03838

BIOLOGICAL EFFECTS OF OCEAN DISPOSAL OF SOLID WASTE,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 5C.
W74-03840

STABILITY OF DILUTE STANDARD SOLUTIONS OF ANTIMONY, ARSENIC, IRON AND RHENIUM USED IN COLORIMETRY,
Loughborough Univ. of Technology (England). Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W74-03842

INSTRUMENTAL PARAMETERS FOR DETERMINATION OF MERCURY BY FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Massey Univ., Palmerston North (New Zealand). Dept. of Chemistry and Biochemistry.
R. R. Brooks.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1306-1312, November 1973. 7 fig, 9 ref.

Descriptors: *Water analysis, Soil analysis, *Mercury, Fish, Sediments, Heavy metals, Organic matter, Aqueous solutions, Rocks, *Spectrophotometry, *Instrumentation.
Identifiers: Atomic absorption spectrophotometry, Instrumental parameters, Biological samples, Flameless AA, Reproducibility, Accuracy.

Studies have been made on the instrumental parameters affecting the performance of the solution-reduction and the thermal-volatilization techniques of flameless atomic absorption for mercury. Optimum conditions established for the solution-reduction technique were: gas flow 5 L/min, stirring time 100 sec, and stirring rate at least 1250 rpm. Optimum conditions for the thermal-volatilization technique were: flow rate 1.5 L/min, heating time 20 sec. The reproducibility and time requirements of the two methods are compared, and guidelines are given on the application of the methods to various kinds of samples such as fish, rocks, sediments, and soils. (Little-Battelle)
W74-03844

NITRATE DETERMINATION BY A MODIFIED CONWAY MICRODIFFUSION METHOD,
Agricultural Research Service, Beltsville, Md. Plant Physiology Inst.

For primary bibliographic entry see Field 2G.
W74-03845

MICROBIOLOGICAL DETERMINATION OF THIRAM,
Belgium Pharmaceutical Association, Brussels.
A. Rappe, G. Mauquoy, and S. Baur.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1517-1518, November 1973. 1 tab, 12 ref.

Descriptors: *Pesticides, *Pollutant identification, Food processing industry, Separation techniques, Pesticide residues, Bioindicators, *Bioassay, Fungicides, Fungi.
Identifiers: *Thiram, Saccharomyces carlsbergensis, Bacillus licheniformis, Flavobacterium, Microbiological determination, Nabam, Ziram, Captan, Ferbam, Agars, Culture media, Detection limits.

A rapid and simple agar plate method has been developed for the microbiological determination of thiram, using Saccharomyces carlsbergensis ATCC 9080 as the test organism. With this organism, as little as 25 ng thiram/well or 200 ng/disk can be detected, well below the levels that can be detected with either Bacillus licheniformis or Flavobacterium as the test strain. The choice of the technique used for assay (well or disk) will depend on the nature of the solvent and the amount of thiram to be analyzed. The assay technique was applied to the dietetic carrot paste preparation spiked with known amounts of thiram. An inhibition zone appeared for 10 ppm thiram, or 10 micrograms thiram/g sample. Although other fungicides, such as nabam, ziram, and captan, also exibit an antibacterial effect on the 3 strains tested, the effect is at higher concentrations. With Saccharomyces carlsbergensis, the limit of detection using the disk method is 2 micrograms for nabam and 1 microgram for ziram or captan. Mercuric derivatives also have an antibacterial activity and thus can be detected by the assay described. The lower limit of detection of phenylmercury nitrate is 1 microgram. (Mortland-Battelle)
W74-03846

CONSOLIDATION CHARACTERISTICS OF DREDGING SLURRIES,
Northwestern Univ., Evanston, Ill. Technological Inst.
A. B. Salem, and R. J. Krizek.
Journal of the Waterways Harbors and Coastal Engineering Division, American Society of Civil Engineers, Vol 99, No WW4, p 439-457, November 1973. 15 fig, 3 tab, 8 ref.

Descriptors: *Heavy metals, *Suspended solids, *Chemical oxygen demand, Oil, *Nutrients, Water analysis, Clays, Nitrogen, Ammonia, Phosphates, Iron, Organic compounds, Lead, Mercury, Carbon, Potassium, Copper, Sodium, Calcium, Consolidation, Soil mechanics, *Ohio.
Identifiers: *Dredge spoils, Characterization, Grease, Volatile solids, Cyanides.

As part of a study of the consolidation characteristics of dredging slurries, dredgings from various sites around Toledo, Ohio, were chemically analyzed. Compositions were as follows: clay, 30-53 percent; total solids, 12.0-43.4 percent; volatile solids, 7.0-14.6 percent; COD, 80-185 mg/gm; organic N, 0.4-5.3 mg/gm; ammonia-N, 0.4-1.7 mg/gm; phosphates, 0.14.2 mg/gm; oil and grease, 0-11.9 mg/gm; hydrocarbons, 0-6.8 mg/gm; iron, 0.3-31.8 mg/gm; cyanide, 0-11.8 micrograms/gm; lead, 50-181 micrograms/gm; mercury, 0-0.4 micrograms/gm; and organic C, 0-7.6 percent. The dredging water contained 0-0.25 ppm Pb, 0-0.85 ppm Cu, 14-32 ppm K, 0-30 ppm Na, 0-132 ppm Ca, and 0-80 ppm Fe. (Little-Battelle)
W74-03847

TRACE ORGANICS IN WATER: THEIR ISOLATION AND IDENTIFICATION,
Ames Lab., Iowa.
A. K. Burnham, G. V. Calder, J. S. Fritz, G. A. Junk, and H. J. Svec.
Journal American Water Works Association, Vol 65, No 11, p 722-725, November 1973. 3 fig, 1 tab, 6 ref.

Descriptors: *Organic compounds, Water pollution, *Pollutant identification, *Isolation, Methodology, Water analysis, Gas chromatography, Organic wastes, Pollutants, Water pollution sources, Separation techniques, Solvent extractions, *Iowa, *Delaware River, Potable water, Chemical analysis.
Identifiers: *Trace levels, Data interpretation, Mass spectra, XAD-2 method, Triglycoldichloride, Elution, Chloroethoxyether, Benzothiazole, Methylbenzothiazole, 2-Thiomethylbenzothiazole, Toluene, Benzene, Pentane, Octane.

A new method for isolating and concentrating organic compounds in potable water involves passing the water through a column packed with XAD-2 polystyrene macroreticular resin, and eluting the mostly neutral, sorbed organic compounds with an appropriate solvent (e.g., ethyl ether). After sorption and elution, the solvent is evaporated, the neutral organics separated by gas chromatography, and the individual compounds identified with a mass spectrometer coupled to the column. Gas chromatography is used in quantitative determinations. Except for the MS identification, the method is simple and relatively rapid; the concentration and elution steps are both quantitative, and when tested, all the organic compounds were recovered in their original form. The method has been used for concentrating and identifying neutral organic impurities in the water of two Iowa cities and of the Delaware River. Data on water from Ames, Iowa, show the distribution of hydrocarbons with respect to geographical proximity to a source of pollution. (Holoman-Battelle)
W74-03848

PROBLEMS IN PHENOLICS-MODELING METHODS IN THE OHIO RIVER AT WHEELING, W. VA.,
Carnegie-Mellon Univ., Pittsburgh, Pa. Mellon Inst. of Science.
F. C. Vigani.
Journal American Water Works Association, Vol 65, No 11, p 725-731, November 1973. 9 fig, 6 tab, 2 ref.

Descriptors: *Forecasting, *Mathematical models, *Ohio River, Water analysis, Data processing, *West Virginia.
Identifiers: *Data interpretation, *Phenolics.

An attempt was made to develop a forecasting function for phenolics in Ohio River water at Wheeling, W. Va., by fitting a time-series model to phenolic data obtained during 1963-1968. The analysis of the data revealed unexpected information on the effect of operator bias on the reported data. Although the historical data are unsuitable for modeling what is occurring in the river, they do reveal information about the activities of the operators in the treatment plant. When the operator bias is removed from the data, there is essentially no structure to the residuals, which indicates no apparant physical or assignable cause relationship in the phenolics-concentration data. The problem that very high concentrations of phenolics affect water quality remains. All available evidence indicates that these rare events follow no deterministic pattern. The extreme values of phenolics concentration may be caused by at least three factors: analytical problems, slugs of nonindustrial origin, and extraordinary industrial discharges. (Little-Battelle)
W74-03849

FORMATION OF PENTAFLUOROBENZYL DERIVATIVES FOR THE IDENTIFICATION AND QUANTITATION OF ACID AND PHENOL PESTICIDE RESIDUES,
Iowa Univ., Iowa City. State Hygienic Lab.
L. G. Johnson.
Journal of the Association of Official Analytical Chemists, Vol 56, No 6, p 1503-1505, November 1973. 1 fig, 3 tab, 9 ref.

Descriptors: *Pollutant identification, *Pesticide residues, *Phenolic pesticides, Chorinated hydrocarbon pesticides, Pollutants, *Gas chromatography, Organic pesticides, 2 4-D, Phenols, Trace elements.
Identifiers: *Pentafluorobenzyl esters, *Ethers, Derivatives, Electron capture gas chromatography, Cleanup, Sample preparation, p p' DDA, Sensitivity, sec-Amyl phenols, 1-Naphthol, p-Nitrophenol, Retention time, m-(1-Methylbutyl) phenol.

A procedure is described for the preparation and electron capture GLC determination of pentafluorobenzyl ester and ether derivatives of 2,4-D, p, p'-DDA, 1-naphthol, p-nitrophenol, and sec.-amyl phenols. A column cleanup procedure quantitatively isolates the derivatives from excess reagents and other interferences. The method can be used as an aid in the confirmation of the identity of pesticide residues and for the quantitative determination of extracted residues. (Holoman-Battelle)
W74-03850

EVALUATION OF A LOW-COST ARSENIC AND SELENIUM DETERMINATION AT MICROGRAM-PER-LITER LEVELS,
Environmental Protection Agency, Cincinnati, Ohio. Water Supply Research Lab.
J. S. Caldwell, R. J. Lishka, and E. F. McFarren.
Journal American Water Works Association, Vol 65, No 11, p 731-735, November 1973. 2 fig, 7 tab, 9 ref.

Descriptors: *Water analysis, *Pollutant identification, *Methodology, Evaluation, Chemical analysis, Pollutants, Water supply, Monitoring, Inorganic compounds.
Identifiers: *Selenium, *Arsenic, *Trace levels, Chemical recovery, Chemical interference, Atomic absorption spectrophotometry, Organometallics, Disodium methyl arsenate, Lead arsenate, o-Arsanilic acid, o-Nitrobenzene-arsonic acid, Selenium oxide, Sodium selenate.

New methods and modifications of known methods of detecting arsenic and selenium in water are described. The modifications are concerned with converting inorganic arsenic and selenium into gaseous hydrides that can be swept into an argon-hydrogen flame of an atomic absorption spectrophotometer. Organic arsenic compounds can be determined like the inorganic compounds after a preliminary digestion with a mixture of nitric, sulfuric, and perchloric acids. Such a procedure does not appreciably interfere with inorganic As determinations. Organic Se was not investigated. Gas-flow rate, Zn concentration, burner head position in relation to light path, and the use of a single-slot burner head were investigated in relation to the decrease of sensitivity and/or extension of the determination range. The previous procedures for these elements are extremely tedious and time consuming, but these new procedures can be performed in a few minutes - thereby permitting routine monitoring of water supplies for As and Se. (Holoman-Battelle)
W74-03851

TREATMENT OF OILY AND METAL-CONTAINING WASTEWATER,
Weston (Roy F.), Inc., West Chester, Pa.
For primary bibliographic entry see Field 5B.
W74-03852

IDENTIFYING SOURCE OF PETROLEUM BY INFRARED SPECTROSCOPY,
Rhode Island Univ., Kingston. Dept. of Chemistry.
P. F. Lynch, and C. W. Brown.
Environmental Science and Technology, Vol 7, No 13, p 1123-1127, December 1973. 4 fig, 3 tab, 9 ref.

Descriptors: *Water pollution sources, *Oil pollution, *Oil spills, *Pollutant identification, Water pollution, Chemical analysis, Computers, Data processing, Methodology.
Identifiers: *Infrared spectrophotometry, *Data interpretation, Crude oil, Fuel oil, Petroleum products, Oil characterization, Kerosene, Petroleum distillates, No. 2 fuel oil, Absorptivity.

The infrared spectra of over 50 samples of crude oils, fuel oils, and other petroleum products have been measured using a Perkin-Elmer Model 521 infrared spectrometer. Bands in the 650-1200/cm spectral region were characteristic of each sample and can be used to identify the source of the sample. Computer analysis of absorptivities of 21 selected bands was used to match unknowns with the correct knowns by taking the ratios of known to unknown absorptivities. The method was demonstrated on laboratory samples and on a sample taken from an actual oil spill. The method of analysis is rapid and it provides unambiguous identification for petroleum products, eliminating the need for adding tracer materials to petroleum products or for other methods of analysis. (Holoman-Battelle)
W74-03854

IN-PLANT BIOLOGICAL MONITORING,
J. Cairns, Jr., and R. E. Sparks.
Industrial Water Engineering, Vol 10, No 5, p 22-24, September/October 1973. 6 fig.

Descriptors: *Industrial wastes, *Water quality, *Bioassay, *Monitoring, Animal physiology, Water pollution effects, Fish, Laboratory equipment, Data processing, Water pollution control, *Bioindicators.

The quality of plant effluents can be monitored by recording the breathing rate, swimming rate or other physiological activites of fish and other organisms subjected to the effluent in tanks. After baseline values have been established with unpolluted water, the presence of toxic substances can be detected by the occurrence of abnormal activity. The sensor signals can be sent to a computer which automatically compares the values with baseline values and sounds an alarm in the event of significant changes. If the alert were sounded, the effluent would be analyzed to detect the toxic pollutant and its sources. The method is also potentially useful for river management. (Little-Battelle)
W74-03855

BRAVE NEW WORLD OF TOC AND TOD.
Industrial Water Engineering, Vol 10, No 5, p 13-17, September-October 1973. 3 fig.

Descriptors: *Biochemical oxygen demand, *Chemical oxygen demand, *Monitoring, *Sewage effluents, Water quality, Automatic control, Water treatment.
Identifiers: *Total organic carbon, *Total oxygen demand.

Because of the shortcomings of BOD and COD tests and time required to obtain results, they are unsatisfactory for real-time control of treatment plant effluents. As a result total organic carbon (TOC) and total oxygen demand (TOD) are being used for this purpose. Although there is no rigorous correlation between TOC and BOD or COD, because of the general consistency of effluent compositions, they all show the same trends. TOC is based on the automatic measurement of the oxygen required to combust the impurities of a water sample. TOD correlates well with COD when interferences are not present. The correlation between TOD and BOD depends on the specific sample. Typical examples of applications of TOC and TOD are discussed and several commercially available instruments are described. (Little-Battelle)
W74-03856

DIFFERENTIAL ELECTROLYTIC POTENTIOMETRY WITH PERIODIC POLARISATION. PART XXI. INTRODUCTION AND INSTRUMENTATION,
Exeter Univ. (England). Dept. of Chemistry.
E. Bishop, and T. J. N. Webber.
Analyst, Vol 98, No 1171, p 697-711, October 1973. 9 fig, 45 ref.

Descriptors: *Instrumentation, *Electrodes, Laboratory equipment, *Electrochemistry, Chemical analysis, Volumetric analysis.
Identifiers: Differential electrolytic potentiometry, *Ion selective electrodes, Potentiometric titration, Periodic polarization, Platinum electrodes, Silver electrodes, Silver halide electrodes, Antimony-antimony oxide electrodes.

Previous work on periodic polarisation of indicator electrodes is reviewed and discussed, and is faulted on the premise that perfectly symmetrical, bias-free waveforms may not have been used. The fabrication, activation and testing of electrodes is described, waveform generators are critically discussed, and measuring instruments for periodic and d.c. potentials are both described and evaluated. A simple device for interfacing instruments to recorders, offering a high degree of band spread, is described. High-voltage square-wave generation by use of relays is also discussed. Waveform monitoring was a crucial factor in the work, and the accurate balancing of shape, amplitude and half-cycle duration is described. Frequency measurement and timing by means of a crystal clock, and amplitude and bias detection by integration and by d.c. differential electrolytic potentiometry, are appraised. Finally, the working assembly is described, together with the technique for the elimination of electrical interference. (See also W74-03860) (Holoman-Battelle)
W74-03859

DIFFERENTIAL ELECTROLYTIC POTENTIOMETRY WITH PERIODIC POLARISATION. PART XXII. SYMMETRICAL PERIODIC CURRENT DIFFERENTIAL ELECTROLYTIC POTENTIOMETRY IN OXIDATION - REDUCTION TITRIMETRY,
Exeter Univ. (England). Dept. of Chemistry.
E. Bishop, and T. J. N. Webber.
Analyst, Vol 98, No 1171, p 712-724, October 1973. 9 fig, 4 tab, 16 ref.

Descriptors: *Aqueous solutions, *Electrochemistry, *Volumetric analysis, *Electrodes, Chemical analysis, Instrumentation, Copper, Iron.
Identifiers: Potentiometric titration, Differential electrolytic potentiometry, Periodic polarization, Precision, End-point errors.

The application of pure, symmetrical, bias-free square, sine and triangular wave periodic polarisation to all types of oxidation - reduction titrations is reported. Electrode configuration and earthing and the destructive effect of bias are examined. Titration curve shapes are the same as those of classical d.c. differential electrolytic potentiometry, but the periodic current densities required are much higher than for d.c. The electrode response speed is greatly accelerated, unpoised potentials are steady, warning is given of the approach of the end-point in type II (b) titrations, electrodes retain full activity for very long periods and errors in titrations of iron (II) with dichromate or cerium (IV) are eliminated in the periodic method as against the d.c. method. Discrimination in type II reactions is slightly attenuated in the periodic method, and in titrations at low concentrations it is considerably attenuated. The nature and the conditions of the titration, the speed of the electrode charge-transfer process, the ballast load, the current density, the electrode area, the shape of the applied waveform, the applied frequency, and the deactivation of electrodes, are examined in detail. The benefit of the constant-current mode over the constant-potential mode is demonstrated. (See also W74-03859) (Holoman-Battelle)
W74-03860

COLORIMETRIC DETERMINATION OF BORON IN AQUEOUS SOLUTIONS AND IN BOROSILICATE GLASS BY SOLVENT EXTRACTION,
General Electric Corporate Research and Development, Schenectady, N.Y.
A. S. Tenney.
Journal of the Electrochemical Society, Vol 120, No 9, p 1284-1285, September 1973. 2 fig, 4 ref.

Descriptors: *Colorimetry, *Aqueous solutions, *Boron, Water analysis, *Spectrophotometry, Absorption.
Identifiers: *Sample preparation, *Detection limits, Chemical interference, Calibration curves.

Boron in aqueous solutions can be determined by adding dilute HF and methylene blue solution to the sample in a polyethylene dropping bottle, shaking, allowing to stand for one hour, adding 1,2-dichloroethane, shaking, allowing to stand overnight, and reading the absorbance in the range 4000-7000 Angstroms with a double-beam recording spectrophotometer. Standards are prepared from boric acid solution. Absorbance curves show three peaks at 4900, 6050-6300, and 6750 Angstroms. Calibration curves show that boron can be determined in the range 0-5 micrograms/ml with an uncertainty of plus or minus 0.05-0.1 microgram/ml using results from the two major peaks. The detection limit is about 0.1 microgram in a 2.0 ml sample. The procedure is simpler than other methods because the double-beam spectrometer subtracts absorbance of the blank and because no procedure is employed to remove interfering ions such as NO3(minus), As(5 minus) and Cr(6 minus). (Little-Battelle)
W74-03862

DETERMINATION OF FLUORINE IN PETROLEUM AND PETROLEUM PROCESS CATALYSTS WITH A FLUORIDE ELECTRODE,
British Petroleum Co. Ltd., Sunbury-on-Thames (England).
J. N. Wilson, and C. Z. Marczewski.
Analytical Chemistry, Vol 45, No 14, p 2409-2412, December 1973. 4 fig, 2 tab, 16 ref.

Descriptors: *Fluorine, *Pollutant identification, *Electrodes, Methodology, Chemical analysis, Halogens, Electrochemistry, Solvent extractions, Separation techniques, Volumetric analysis.
Identifiers: *Petroleum process catalysts, *Petroleum products, *Sample preparation, Fluoride electrodes, Crude oil, Petroleum residues, Precision, Repeatability, Fuel oil, Spindle oil, Chemical recovery, Detection limits, Alaskan crude, Arabian light crude, Arabian heavy crude, Iranian light crude, Iranian heavy crude, Petroleum distillates, Fluorided catalysts, Iraq crude, Kuwait crude, Libyan crude, Nigerian crude, p-Fluorobenzoic acid.

Procedures have been developed for the preparation of analytical solutions from crude oils, residues, products, and process catalysts, suitable for the direct measurement of fluoride ion concentration with a fluoride electrode. Finely ground

catalyst samples are mixed with the fusion flux, heated, dissolved in water, buffer is added, and the EMF measured. For crude oil or residues or petroleum products, a quantity is weighed, dried, reweighed, and twice extracted in a separatory funnel. The aqueous phase was further extracted, diluted with water, and neutralized for the measurement of the EMF. Under the conditions described for the analysis of catalysts, the electrode response was Nernstian down to concentrations of 0.4 ppm fluoride, and deviated only very slightly between 0.4 and 0.1 ppm fluoride. The analysis of petroleum samples was completed entirely in the non-Nerstian region of electrode response. Fluorided catalysts were analyzed by the above method and by thorium nitrate titration following a standard Willard and Winter distillation. Generally good agreement was obtained for the 2 methods; the new method was about 5 times as quick and yielded much closer duplicates. Repeatable results were obtained with 10 crude oils using maximum sample sizes of 2.5 g. The limitation of sample size did not apply to distillate products, and determinations are possible at levels as low as 10 parts per billion. The series of light distillates presented show the excellent repeatability of the method over a wide range of fluoride concentrations. (Holoman-Battelle)
W74-03864

DIRECT DETERMINATION OF SULFIDE BY RAPID DIRECT CURRENT POLAROGRAPHY,
Melbourne Univ., Parkville (Australia). Dept. of Physical Chemistry.
For primary bibliographic entry see Field 2K.
W74-03865

SIMULTANEOUS DETERMINATION OF FERROCYANIDE AND FERRICYANIDE IN AQUEOUS SOLUTIONS USING INFRARED SPECTROMETRY,
Kokak (Australasia) Pty Ltd., Coburg (Australia). Research Labs.
D. M. Drew.
Analytical Chemistry, Vol 45, No 14, p 2423-2424, December 1973. 1 fig, 2 tab, 14 ref.

Descriptors: Aqueous solutions, *Chemical analysis, *Pollutant identification, Cations, Anions, *Spectrophotometry.
Identifiers: *Infrared spectrophotometry, *Ferrocyanides, *Ferricyanides, Absorbance, Chemical interference, Sodium thiosulfate, Ammonium sulfate, Molar absorptivity.

An infrared spectrophotometric procedure has been described for the simultaneous determination of ferricyanide and ferrocyanide in aqueous solutions. Photographic bleach and fixer samples were analyzed after dilution by a factor of five to bring the concentrations of ferricyanide and ferrocyanide into the analytical range. The spectrum was recorded in the region from 2200 to 2000/cm; the absorbance of ferricyanide was obtained at 2115/cm and ferrocyanide at 2040/cm. Absorbance readings taken from five determinations show standard deviations of plus or minus 0.02A for both species. For the interference work, the study was restricted to the effect of anions and cations most common to the photographic solutions in question. The determination of ferrocyanide was not affected by the presence of sodium thiosulfate and ammonium sulfate either separately or together. Ammonium sulfate had no effect on the determination of ferricyanide. Sodium thiosulfate was not added to the later solutions because of its reaction with ferricyanide. (Holoman-Battelle)
W74-03866

COLUMN PARTITION CHROMATOGRAPHIC DETERMINATION OF SODIUM ALKANE MONOSULFONATES,
Texaco Trinidad, Inc., Pointe-a-Pierre (Trinidad). Research Lab.
W. R. Ali, and P. T. Laurence.
Analytical Chemistry, Vol 45, No 14, p 2426-2428, December 1973. 1 fig, 3 tab, 15 ref.

Descriptors: *Separation techniques, *Chromatography, *Sulfonates, Detergents, Surfactants.
Identifiers: Sodium alkane monosulfonates, Column chromatography, *Monosulfonic acids, Sample preparation, Organic acids, Disulfonic acids, Polysulfonic acids.

Alkane monosulfonic acids can be quantitatively separated from di- (and poly-) sulfonic acids over a wide range of carbon number (C9-C20) by a column partition chromatographic method using moist cellulose packing. After washing cellulose with water and drying, a slurry was prepared by blending cellulose with water and petroleum either. This slurry was packed in the chromatographic columns to a depth of 30 cm. Acid samples from which sodium sulfate was removed were pipetted directly onto the column and the monosulfonic acids eluted with n-butanol in petroleum ether and the disulfonic acids with water. The two fractions were titrated with alkali using phenolphthalein indicator. 2-Propanol was used as cosolvent in titrating the monosulfonic acid fraction. Results of analysis of one sample at intervals over 9 months showed the repeatability of the method to be very good. (Little-Battelle)
W74-03867

DETERMINATION OF SUBMICROGRAM LEVELS OF PHENOL IN WATER,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
P. D. Goulden, P. Brooksbank, and M. B. Day.
Analytical Chemistry, Vol 45, No 14, p 2430-2433, December 1973. 4 fig, 7 ref.

Descriptors: *Phenols, *Pollutant identification, *Methodology, *Water analysis, Pollutants, Colorimetry, Solvent extractions, Chemical analysis, Distillation, Aqueous solutions, Separation techniques.
Identifiers: *Trace levels, *Chromogenic reagents, Detection limits, 4-Aminoantipyrine, Chemical interference, 3-Methyl-2-benzothiazolinone hydrazone, Precision.

Continuous distillation equipment which permits the distillation of comparatively large sample flows in an automated system has been used in the determination of phenol in water. The sample flow is distilled and condensed, and after the color formation step utilizing color-developing reagents, the dye is concentrated by extraction into a small solvent flow. This technique has been used with both 4-aminoantiphrine (4AAP) and 3-methyl-2-benzothiazolinone hydrazone (MBTH), at a sample rate of 10 per hour. The limit of detection for the two methods is 0.2 microgram/l. phenol. The coefficient of variation of the 4AAP method was 3.6 percent and that of the MBTH method, 2.4 percent. The step that separates the phenols from interfering substances is a single distillation, hence the method is applicable only to those relatively 'clean' waters for which this single distillation constitutes a satisfactory 'clean-up' procedure. (Holoman-Battelle)
W74-03868

IMPROVEMENTS IN THE WET OXIDATION-DITHIZONE METHOD FOR DETERMINING LOW MERCURY LEVELS IN FOOD,
Medical Academy, Gdansk (Poland). Dept. of Bromatology.
M. Nabrzyski.
Analytical Chemistry, Vol 45, No 14, p 2438-2440, December 1973. 2 tab, 9 ref.

Descriptors: *Separation techniques, *Foods, *Fish, *Water analysis, *Mercury, Colorimetry, Hydrogen ion concentration, Oxidation.
Identifiers: *Biological samples, Sample preparation, Recovery, Chemical interference.

The wet oxidation-dithizone method for determining mercury was improved by successively combining the dithizonate extracts obtained from two or more digested samples to prepare one sample richer in mercury. The procedure was tested with samples of fish, milk powder, or rice grains which were oxidized in a flask with a mixture of sulfuric, perchloric, and nitric acids, the contents filtered, diluted with water, divided into two portions, and evaporated. Extraction was carried out by transferring samples into separatory funnels, shaking with acetic acid and chloroform, discarding the chloroform layer, and adding diluted dithizone in chloroform. Extracts were then combined, sulfuric acid and sodium nitrite added, the solutions heated to remove chloroform and nitrous acid, diluted with water and hydroxylamine chloride, cooled, acetic acid added, and the solution run into a separatory funnel. This solution was then analyzed by a visual or colorimetric procedure, both of which are described. Investigations with radioactively labeled samples showed that recovery of Hg was good. Analysis of fish digestate to which copper was added showed that copper did not interfere with Hg extraction at pH O. Since Hg was selectively extracted at this pH, the procedure can be used for simultaneous determination of both elements in foods. The procedure can also be used to analyze natural waters. (Little-Battelle)
W74-03869

ALGAL GROWTH PREDICTION USING GROWTH KINETIC CONSTANTS,
National Inst. for Water Research, Pretoria (South Africa).
For primary bibliographic entry see Field 5C.
W74-03871

EFFECT OF PHENOL ON OXYGEN UPTAKE RATE OF A LABORATORY POPULATION OF CHIRONOMUS ATTENUATUS (WALK.),
Mid-America Nazarene Coll., Olathe, Kans.
For primary bibliographic entry see Field 5C.
W74-03872

THERMOPHILIC FUNGI IN A MUNICIPAL WASTE COMPOST SYSTEM,
Florida Univ., Gainesville. Dept. of Botany.
B. E. Kane, and J. T. Mullins.
Mycologia, Vol 65, No 5, p 1087-1100, September/October 1973. 5 fig, 4 tab, 31 ref.

Descriptors: *Waste disposal, *Cultures, *Sampling, Monitoring, Environmental effects, Temperature, Growth rates, Aerobic conditions, Cellulose, Oxygen, Carbon dioxide, Hydrogen ion concentration, Acidity, Solid wastes, Separation techniques, Carbon, Pigments, Municipal wastes, Pollutants, Pollutant identification.
Identifiers: *Thermophilic fungi, Compost, Aspergillus fumigatus, Chaetomium thermophile, Humicola lanuginosa, Mucor pusillus, Thermoascus aurantiacus, Torula thermophila, Agars.

A high-rate municipal compost system was systematically sampled during the digestion period for the presence of thermophilic fungi. The objectives were to (1) monitor environmental conditions during composting, (2) develop sampling and culturing techniques for isolating thermophilic fungi from compost, and (3) examine environmental requirements for growth of the isolated fungi. The compost consisted of sorted municipal refuse which was shredded, moistened with water or sewage sludge, and piled in tanks. The compost atmosphere, sampling procedures, and culturing techniques used are described and experiments to determine the ability of selected isolates to grow on cellulose are outlined. Pure cultures of 304 isolates were established. These included Aspergillus fumigatus, Chaetomium thermophile, Humicola lanuginosa, Mucor pusillus, Thermoascus aurantiacus, and Torula thermophila. It was demonstrated that (1) a thermophilic relationship exists

between temperature and growth, (2) a requirement exists for aerobic growth conditions, and (3) only C. thermophile utilized cellulose as a carbon source. It was concluded that thermophilic fungi are present during composting in a mechanically assisted digestion. They were isolated at all times during the composting and there is no apparent succession of species. High temperature, acidity, and anaerobic conditions may limit growth in the interior of the pile and thus restrict the role of these fungi. (Mortland-Battelle)
W74-03875

CHANGES IN CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF A HEAVY RESIDUAL OIL WEATHERING UNDER NATURAL CONDITIONS,
Nova Scotia Technical Coll., Halifax.
For primary bibliographic entry see Field 5B.
W74-03877

TEMPERATURE-GRADIENT INCUBATOR FOR THE GROWTH OF CLOSTRIDIA,
Washington Univ., Seattle. Inst. for Food Science and Technology.
J. R. Matches, and J. Liston.
Canadian Journal of Microbiology, Vol 19, No 9, p 1161-1165, September 1973. 2 fig, 1 tab, 7 ref.

Descriptors: *Clostridium, *Cultures, *Incubation, Thermophilic bacteria, *Bacteria, *Anaerobic bacteria, Laboratory equipment, Design criteria, Temperature, Research equipment.
Identifiers: Incubators, Mesophilic bacteria, Psychrophilic bacteria.

A temperature-gradient incubator was constructed and used for the growth of clostridia. With this instrument the minimum, optimum, and maximum temperatures can be obtained for 12 organisms at one time. The incubator can also be adjusted for psychrophiles and thermophiles. This unit is mounted on wheels, self-contained, and can easily be moved from room to room. The main part of the portable unit is the block of aluminum which measures 36 in. X 13 in. X 4 1/4 in. This block contains 12 rows of 11/16-in. holes 4 in. deep, with 32 holes per row, spaced at 1-in. centers, giving a total of 384 tubes. The block is drilled and tapped at both ends with 1-in. pipe threads through which the cooling and warming liquids are pumped. The antifreeze for the cold end and water for the warm end of the incubator are held in 6.2-gal. stainless steel tanks containing 5.6 gal. each. One bath is cooled with a 1/3 horsepower sealed refrigeration unit connected to a cylindrical shaped evaporator constructed from 31 ft of 1/4-in. copper tubing. The other bath is heated with a 500-W tube-type immersion heater. The temperature in both tanks is controlled with mercury to platinum thermoregulators and solid state mercury plunger relays. The incubator was designed so that the desired temperature could be obtained rapidly and the incubator could be operated with the covers open without appreciable change in the temperature gradient. (Mortland-Battelle)
W74-03878

PHENOTYPIC VARIABILITY OF THE ENVELOPE PROTEINS OF KLEBSIELLA AEROGENES,
Microbiological Research Establishment, Salisbury (England).
For primary bibliographic entry see Field 5C.
W74-03882

A LIQUID ION-EXCHANGE NITRATE-SELECTIVE ELECTRODE BASED ON CARBON PASTE,
Uppsala Univ. (Sweden). Dept. of Analytical Chemistry.
G. A. Qureshi, and J. Lindquist.
Analytica Chimica Acta, Vol 67, No 1, p 243-245, November 1973. 1 fig, 1 tab, 4 ref.

Descriptors: *Design criteria, *Nitrates, *Water analysis, Calibrations, Materials, Aqueous solutions, Electrical equipment, *Electrodes, *Pollutant identification.
Identifiers: *Ion selective electrodes, Detection limits, Reproducibility, Nitrate electrodes, Chemical interference, Lifetime, Response time, Storage.

To overcome the disadvantages of inner reference electrodes and membranes, a liquid ion-exchange nitrate selective electrode was constructed using wax-treated carbon powder mixed with Orion Liquid 92-07-02. The wax isolates the carbon to prevent pH-responses from surface oxides. The basic preparation procedure consisted of dissolving ceresin wax in n-hexane, adding graphite powder, heating, mixing the dried powder with the ion-exchange liquid, and compacting in a 10 mm teflon rod fitted with a metal piston which also served as the contact. The reference electrode was a saturated calomel electrode with a fiber junction. Calibration of the electrode in the range of 0.1-0.000001 M sodium nitrate showed reproducibility to be plus or minus 0.2 mV. Response was linear from 0.1 to 10 to the minus 4.5 power with a slope of 58 mV/decade activity. Selectivity was as good or better than that of commercial electrodes when phosphate, sulfate, chloride, bromide, perchlorate, and iodide were present. Response time was 8-10 minutes with a new surface, but decreased to 2-3 minutes. Lifetime was 4-6 months when the electrode was stored in a glass tube. (Little-Battelle)
W74-03884

NORTH CAROLINA MARINE ALGAE. II. NEW RECORDS AND OBSERVATIONS OF THE BENTHIC OFFSHORE FLORA,
Duke Univ., Durham, N.C. Dept. of Botany.
C. W. Schneider, and R. B. Searles.
Phycologia, Vol 12, Nos 3/4, p 201-211, December 1973. 4 fig, 27 ref.

Descriptors: *Marine algae, *Chlorophyta, *Phaeophyta, *Rhodophyta, *Benthic flora, *North Carolina, Distribution, Marine plants, Kelps, Speciation, Sea water.
Identifiers: Chaetomorpha crassa, Anadyomene stellata, Microdicyton boergesenii, Struvea ramosa, Padina profunda, Dictyota ciliolata, Galaxaura obtusata, Scinaia complanata, Dudresnaya crassa, Cryptonemia luxurians, Kallymenia perforata, Predaea masonii, Gracilaria blodgettii, Gracilaria mammillaris, Plocamium brasiliense, Neoagardhiella ramosissima, Solieria tenera, Eucheuma isiforme, Gigartina stellata, Botryocladia pyriformis, Agardhinula browneae, Heterosiphonia wurdemanni, Bryothamnion seaforthii.

Twenty new records from North Carolina are reported including four species of green algae, two species of brown algae, and fourteen species of red algae. Nineteen of these collections constitute the northernmost records of these species, though most are found in the Bermudian flora. The other new record, that of Gigartina stellata (Stackhouse) Batters, represents a new southern extension for this northern species. Two previously questionable records and one species known only from shallow water in North Carolina are verified as members of the deep water offshore flora. A clarification of the records of Agardhiella tenera (J. Agardh) Schmitz in this area is given. (See also W73-00284) (Holoman-Battelle)
W74-03885

A SOLVENT-EXTRACTION METHOD FOR THE DETERMINATION OF MANGANESE-54 IN SEA WATER,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
W. W. Flynn.
Analytica Chimica Acta, Vol 67, No 1, p 129-134, November 1973. 2 tab, 6 ref.

Descriptors: *Solvent extractions, *Pollutant identification, *Methodology, *Sea water, Chemical analysis, Cations, Heavy metals, Alkaline earth metals, Water analysis, Separation techniques, Pollutants, Colorimetry, Anions, Halogens, *Manganese.
Identifiers: *Mn-54, Chemical recovery, Detection limits, Ionic interference, Rare earth elements, Manganese radioisotopes, Di(2-ethylhexyl) phosphoric acid.

A solvent-extraction procedure is described for the determination of manganese-54 in seawater. The water (1 liter) is buffered to pH 3.8 and extracted with di(2-ethylhexyl) phosphoric acid in n-heptane. The manganese-54 with carrier is stripped from the organic phase, and eventually precipitated as the dioxide; the precipitate is dissolved in hydrochloric acid and counted in a scintillation counter. Chemical recovery is determined colorimetrically. Samples spiked with manganese-54 showed quantitative recovery from 1 liter of seawater with a typical recovery of 70-75 percent of carrier. The method is applicable to seawater containing many other ions, and decontamination factors for a wide range of radionuclides are reported. The limit of detection is ca. 0.00000001 microCi/ml. (Holoman-Battelle)
W74-03886

DETECTION AND QUANTITATIVE MEASUREMENT OF FECAL WATER POLLUTION USING A SOLID-INJECTION GAS CHROMATOGRAPHIC TECHNIQUE AND FECAL STEROIDS AS A CHEMICAL INDEX,
Sherbrooke Univ. (Quebec). Dept. of Biochemistry.
J. Dougan, and L. Tan.
Journal of Chromatography, Vol 86, No 1, p 107-116, November 1973. 5 fig, 2 tab, 21 ref.

Descriptors: *Gas chromatography, *Pollutant identification, Separation techniques, Water pollution, Enteric bacteria, Coliforms, Water analysis, Sewage effluents.
Identifiers: *Fecal pollution, *Coprostanone, Sample preparation, Gas liquid chromatography, Thin layer chromatography, Cholesterol, Coprostanol, Steroids.

Gas chromatography was used to detect the fecal steroids, cholesterol, coprostanol, and coprostanone in surface waters to evaluate the usefulness of this procedure for detecting fecal pollution. Samples were extracted with hexane and further processed to produce a residue. This residue was qualitatively analyzed by gas-liquid chromatography by adding dioxane, applying the solution to the spiral part of the solids injector syringe, evaporating, and injecting into a combined OV-1/OV-210 column. The remaining solution was air dried and kept for further purification by thin-layer chromatography. Samples were quantitatively analyzed by injecting the sample and a standard solution into the gas chromatograph, producing traces, and determining weight ratios by cutting and weighing peak areas. Coliform counts were also made on separate portions of the samples for comparison with the results from chromatography. On the basis of the results obtained, coprostanone appears to be the best index of fecal pollution. It is possible to measure this compound at a contamination level in the 400 picogram per milliliter range. No simple relationship seems to exist between coprostanone content of polluted water samples and classical coliform counts. To be most useful the method should be combined with classical microbiological measurements. (Little-Battelle)
W74-03887

A STUDY OF MERCURIALS IN THE ELEPHANT BUTTE RESERVOIR ECOSYSTEM,
New Mexico Univ., Albuquerque. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-03899

APPLICATION OF A NEW METHOD FOR PHOSPHATE CONCENTRATION MEASUREMENTS IN NATURAL AND WASTE WATERS,
Wisconsin Univ., Milwaukee. Dept. of Chemistry.
C. O. Huber, D. Karweik, and R. E. Reim.
Available from the National Technical Information Service as PB-227 456; $3.25 in paper copy, $1.45 in microfiche. University of Wisconsin Water Resources Center Madison Technical Report 73-12, October 1973. 35 p, 6 fig, 9 tab, 23 ref. OWRR A-044-WIS(2). 14-31-0001-3550, 14-31-0001-3850.

Descriptors: *Phosphates, Water pollution sources, *Phosphorus compounds, Analytical techniques, *Nutrients, *Measurement, Cathodes, *Electrodes, *Pollutant identification.
Identifiers: Polyphosphate, Pyrophosphate.

The characteristics of the cathodic response of the lead dioxide electrode to polyphosphate species were examined. Fabrication and response characteristics of various forms of the electrode were investigated. Maximum sensitivity is obtained with an electroplated electrode, but overall convenience and utility indicate the paraffin wax-bound electrode as the device of choice. Scanning electron microscopy showed that the electrode surface consists of approximately 0.01 mm particles protruding from the paraffin 'floor.' The analytical response was shown to be linear over limited concentration ranges, but showed a saturation effect over larger concentration ranges (0.00001 to 0.01 M). Sensitivity is somewhat specific for each measurement series; therefore, standard addition and titration techniques are the most pertinent analytical procedures. Measurements of various polyphosphate solutions are reported. In additon, the measurement system was successfully applied to hydrolysis rate and metal complex stability evaluations. The electrode reaction provides a new and useful analytical tool for polyphosphate concentrations in water chemistry and water monitoring. The fact that the new method is specific for polyphosphates in the presence of orthophosphate suggests that it should be applicable to many water investigations.
W74-03900

YELLOW-GREEN ALGAE OF WASTES, (IN UKRANIAN),
Kharkov State Univ. (USSR). Dept. of Lower Plants.
T. V. Dohadina.
Ukr Bot Zh. Vol 29, No 1, p 114-116. 1972. (English summary).
Identifiers: Algae, *Tribonema, Wastes, Water chemistry, *Pollutant identification.

Seven species of yellow-green algae were found and determined when studying algal flora of wastes. The data are presented on chemistry of water for each species. Only representatives of the genus Tribonema are often observed in mass development in wastes.--Copyright 1973, Biological Abstracts, Inc.
W74-03919

WATER SAMPLING AND LABORATORY SERVICE,
Bridgeport Hydraulic Co., Conn.
A. R. Castorina.
Journal American Water Works Association, Vol 65, No 12, p 806-810, December 1973. 3 photo.

Descriptors: *Water sampling, *Utilities, *Water supply, *Chemical analysis, *Quality control, Data collections, Laboratory tests, Measurement, Testing procedures, Water analysis, On-site data collections, Evaluation, Water works, Water consumption, Water quality.

Today's water consumer demands uniformly high quality, ample quantity and a reasonable price. To satisfy this demand the water purveyor must have a well-planned analytical program that will provide information essential to producing good water. The analyses must be pertinent since some problems are universally present in all water supplies while others are unique to certain localities. Problems a small water utility faces in checking the quality of its water are discussed; utilities in Connecticut are used as examples. One of the biggest problems is untrained personnel at the water treatment plant. Employment of a consulting laboratory is a viable solution. Determination of what kind of test program is necessary, choice of a competent consultant and the necessity of complete cooperation between the utility and the consultant are also discussed. (Comfort-Florida)
W74-04024

LOSS OF MERCURY FROM WATER DURING STORAGE,
Environmental Health Lab., McClellan AFB, Calif.
R. V. Coyne, and J. A. Collins.
Available from NTIS, Springfield, Va. 22151 as AD-757 861. Price $3.00 printed copy; $1.45 microfiche. Report No 71M-18, September 1971. 15 p, 1 fig, 4 tab, 20 ref.

Descriptors: *Chemical reactions, *Mercury, *Preservation, *Water sampling, *Laboratory tests, Analytical techniques, Storage, Acids, Hydrogen ion concentration, Correlation analysis.
Identifiers: *Mercury loss from water samples.

Rate of loss of mercury from dilute solutions stored in polyethylene containers was studied. Storage conditions and time intervals were similar to those encountered during the normal collection and shipment of water samples to a testing laboratory. Analyses were performed by acid digestion-stannous chloride reduction followed by mercury-vapor atomic absorption measurement. Results indicated losses up to 100% in known added concentrations of mercury; losses were observed from both glass-distilled water and from locally-procured creek water samples. Some of this loss (approximately 20%) was immediate after adding mercury (0.05 mg/liter) to a container of water; subsequent losses occurred over a matter of a few days. Addition of an acid preservative to a water sample after its collection did not appreciably reduce the loss of mercury as compared to an unpreserved sample; some benefit was obtained by collecting the water sample into a container already containing acid. Of the acids studied (nitric, sulfuric, hydrochloric, phosphoric, acetic), only nitric acid to a final pH of 1 showed any substantial ability to maintain the mercury concentration. The dissappearance of mercury was more rapid at the 0.05 mg/liter level than at the 0.5 mg/liter level. (Woodard-USGS)
W74-04048

FIELD WATER-QUALITY INFORMATION ALONG THE PROPOSED TRANS-ALASKA PIPELINE CORRIDOR, SEPTEMBER 1970 THROUGH SEPTEMBER 1972,
Geological Survey, Anchorage, Alaska.
J. W. Nauman, and D. R. Kernodle.
Basic-Data Report, 1973. 22 p, 1 fig, 3 tab, 9 ref.

Descriptors: *Water quality, *Surface waters, *Baseline studies, *Alaska, *Pipelines, Oil industry, Water analysis, Chemical analysis, Basic data collections, Streams, Rivers, Lakes, Ice, Temperature, On-site investigations.
Identifiers: *Trans-Alaska pipeline corridor.

Field water-quality information was collected during parts of 1970, 1971, and 1972 among the proposed trans-Alaska pipeline corridor. The data include measurements of water and air temperature, specific conductance, alkalinity, pH, dissolved oxygen, chlorophyll 'a' stream discharge, and ice conditions for 69 sites. At 11 stream sites 24-hour studies were conducted, and additional data on barometric pressure, light intensity, percent cloud cover, and wind conditions are presented for these studies. Seasonal turbidity data are presented also. (Woodard-USGS)
W74-04054

ABSORPTIOMETRIC DETERMINATION OF TRACE AMOUNTS OF SULPHIDE ION IN WATER,
Mosul Univ. (Iraq). Dept. of Chemistry.
S. A. Rahim, A. Y. Salim, and S. Shereef.
Analyst, Vol 98, No 1173, p 851-856, December 1973. 6 tab, 9 ref.

Descriptors: *Sulfides, *Water analysis, Chemical analysis, *Colorimetry, *Absorption, Iron, Hydrogen sulfide, Laboratory tests, Analytical techniques, Pollutant identification.
Identifiers: Absorptiometry.

A sensitive and rapid method for the determination of small concentrations of sulfide in water is based on the reduction of iron(III) to iron(II) by sulfide at pH 3 in the presence of 1,10-phenanthroline reagent, forming the orange-red complex ((C12H8N2)3Fe)(2+). The method is subject to some interferences, which fortunately are not usually present in water supplies. Interferences of many acidic and basic radicals can be successfully overcome by recovery of hydrogen sulfide by steam distillation from the samples acidified with sulfuric acid. As little as 0.5 micrograms or a concentration of 33 micrograms per liter of sulfide can be detected by the method if 15 ml of sample are available. (Knapp-USGS)
W74-04072

APPLICATION OF THE CARBON CUP ATOMISATION TECHNIQUE IN WATER ANALYSIS BY ATOMIC-ABSORPTION SPECTROSCOPY,
Nuklearni Institut Jozef Stefan, Ljubljana (Yugoslavia).
F. Dolinsek, and J. Stupar.
Analyst, Vol 98, No 1173, p 841-850, December 1973. 8 fig, 8 tab, 16 ref.

Descriptors: *Flame photometry, *Spectrophotometry, *Heavy metals, Spectrometers, Spectroscopy, Water analysis, Water quality, Lead, Copper, Cadmium, Equipment, Instrumentation, Pollutant identification.
Identifiers: *Atomic absorption spectroscopy.

A modified, laboratory-made carbon cup (small-scale Massmann) atomizer was designed for atomic-absorption determination of copper, lead and cadmium in water samples. Injection of a 10 microliter sample in one portion is the most convenient technique with respect to sensitivity and speed of operation. Addition of EDTA causes an enhancement of sensitivity, which is considerable when determining lead. The adsorption of these elements on the polyethylene containers was examined in order to evaluate possible errors that may arise after sample storage. The detection limits are 0.45 ng per ml of lead, 1.7 ng per ml of copper and 0.04 ng per ml of cadmium, and the average precision is 3% in a single measurement. (Knapp-USGS)
W74-04073

AN ELECTROCHEMICAL METHOD FOR MONITORING THE OXYGEN CONTENT OF AQUEOUS STREAMS AT THE PART-PER-BILLION LEVEL,
Oak Ridge National Lab., Tenn.

R. E. Meyer, F. A. Posey, and P. M. Lantz.
Desalination, Vol 11, No 3, p 392-340, 1972. 6 fig, 1 tab, 6 ref

Descriptors: *Analytical techniques, *Electrochemistry, *Monitoring, *Oxygen, Technology, Dissolved oxygen.

Theory and apparatus for a device for monitoring dissolved oxygen content of aqueous streams at the part-per-billion level is described. It makes use of an exchanger in which dissolved oxygen in the test stream penetrates an oxygen-permeable membrane and equilibrates with the dissolved oxygen in an internal sensor stream. Oxygen content of the internal sensor stream is then monitored by quantitative reduction in a porous silver electrode maintained at an appropriate potential. Accuracy of the device is one or two ppb in the 0-100 ppb range. On the basis of the measurements made, the device will be especially useful for monitoring dissolved oxygen content of desalination plant streams and other process streams where plant operation and/or corosion behavior of metallic materials depends critically on the oxygen level. Because of ease of operation, insensitivity to temperature, and freedom from calibration problems, it should be possible to develop instrumentation modules having a wide variety of monitoring and readout capabilities. It has, however, been tested only in the laboratory. Operating experience in a plant is necessary, especially to determine whether the cilicone membrane material will maintain its integrity and permeability. (Jones-Wisconsin)
W74-04104

INTERIM ENVIRONMENTAL MONITORING REPORT: JANUARY-JUNE 1973,
Mound Lab., Miamisburg, Ohio.
D. G. Carfagno, and W. H. Westendorf.
Available from NTIS, Springfield, Va., as Rept. No. MLM-2085. $4 per copy, $1.45 microfiche. Report No. MLM-2085, August 31, 1973. 21 p, 3 fig, 8 tab, 3 ref, append.

Descriptors: Survey, *Radioactivity, *Radioisotopes, *Monitoring, Measurement, *Assay, Environment, Air pollution, Water pollution, Soil contamination, Agriculture, Food chains, Population, Public health, Fallout, Path of pollutant, Tritium, *Ohio.
Identifiers: *Great Miami River(Ohio), Polonium, Plutonium.

The environment surrounding Mound Laboratory was monitored, and the results for the first half of 1973 are reported. The average concentrations of polonium-210, plutonium-238, and tritium measured in air and water samples were well within the stringent standards adopted by the Atomic Energy Commission and the Environmental Protection Agency. The results of the analyses of foodstuffs and soil samples for radioactive species, as well as the results of analyses of all samples for nonradioactive species, will be presented in the year-end Annual Environmental Monitoring Report. A slight increase in plutonium-238 in the streams was reflected along with a decreased concentration of tritium. (Houser-ORNL)
W74-04174

COMPARISON OF MEASURED AND CALCULATED RADIATION EXPOSURE FROM A BOILING WATER REACTOR PLUME,
New York Operations Office (AEC), N.Y. Health and Safety Lab.
For primary bibliographic entry see Field 5B.
W74-04175

EFFECT OF X-IRRADIATION ON THE INCORPORATION OF GLYCINE-C14 IN THE TISSUE OF ATLANTIC SALMON LARVAE,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
For primary bibliographic entry see Field 5C.
W74-04181

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE MONTICELLO NUCLEAR GENERATING PLANT, MONTICELLO, MINNESOTA, AUGUST 1970.
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W74-04185

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING BIG ROCK POINT NUCLEAR PLANT, BIG ROCK POINT, MICHIGAN, 1968,
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W74-04186

ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1970,
Battelle-Pacific Northwest Labs., Richland, Wash. Environmental Evaluations Section.
For primary bibliographic entry see Field 5B.
W74-04192

AERIAL DETECTION OF SPILL SOURCES,
McDonnell Aircraft Co., St. Louis, Mo. Reconnaissance Lab.
C. L. Rudder, A. G. Wallace, and C. J. Reinheimer.
Copy availabble from GPO Sup Doc as EPI.23/2:73-289, $0.55; microfiche from NTIS as PB-228 105, $1.45. Environmental Protection Agency, Technology Series Report, EPA-R2-73-289, September 1973. 23 p, 13 fig, 2 tab, 4 ref. EPA Project 15080.

Descriptors: *Oil spills, Oil pollution, Chemical analysis, Water pollution sources, *Remote sensing, *Aerial photography, *Pollutant identification.
Identifiers: *Photographic interpretations, Color photography, Multiband photography, Petroleum products, Spectral analysis.

An imagery interpretation key of the petroleum industry was developed for use with an aerial surveillance spill prevention system. Aerial baseline and stereogram photographs as well as aerial multiband, aerial oblique, and ground photographs of oil refineries were obtained for inclusion in the key. Processing systems to convert crude oil to fuel and LPG, gasoline, heavy fuel oils, lubricating oils and asphalt were identified with the help of military oil refinery interpretation keys. Three petrochemical facilities within the refinery were also located and identified. The identification of potential spill sources as related to processing systems, product storage and disposition of by-products and waste was performed. The results were confirmed by refinery personnel and included in the oil refinery key. Concurrent with the flight program, fifteen samples of spilled material were obtained along with the appropriate ground truth data. Chemical and spectral analyses of the samples were performed and correlated with the multiband image analysis. Finally the use of aerial photography for temporal change detection was evaluated and included in the appropriate sections of the key. (EPA)
W74-04196

ENVIRONMENTAL APPLICATIONS OF ADVANCED INSTRUMENTAL ANALYSES: ASSISTANCE PROJECTS, FY 72,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
A. L. Alford.
Copy available from GPO Sup Doc as EPI.23:660/2-73-013, $0.85; microfiche from NTIS as PB-228 147, $1.45. Environmental Protection Technology Series Report, EPA-660/2-73-013, September 1973. 46 p, 14 fig, 7 tab. EPA Project 16020 GHZ.

Descriptors: *Water pollution sources, *Pollutant identification, *Analytical techniques, Industrial wastes, Mine wastes, gas chromatography, Mass spectrometry, Polarographic analysis, Neutron activation analysis, Metals, Polychlorinated biphenyls, *Measurement, Instrumentation, *Waste identification, Organoleptic properties.
Identifiers: Atomic absorption spectrophotometry, Infrared spectroscopy, Ultraviolet spectroscopy.

Identification and measurement of aquatic pollutants are discussed under 13 project categories. In most cases these analyses helped to solve, or at least to understand more clearly, the related pollution incident and in some cases provided evidence for enforcement of regulatory legislation. These projects illustrate the need for many different analytical techniques to identify pollution sources. Continued development of new methods and improvement of existing techniques are required. (EPA)
W74-04197

THE EFFECT OF THERMAL ACCLIMATION ON HEART RATE AND OXYGEN CONSUMPTION OF FROGS DURING SUBMERGENCE,
British Columbia Univ., Vancouver. Dept. of Zoology.
D. R. Jones.
Comparative Biochemistry and Physiology, Vol 41A, No 1, p 97-104, 1972, 3 fig, 22 ref.

Descriptors: *Oxygen requirement, *Temperature, *Frogs, *Respiration, Bioassay, *Water temperature, Laboratory tests, Biology.
Identifiers: Acclimation.

Studies of Rana pipiens yielded the following results: Heart rate of warm (25C) acclimated frogs fell to a lower level (40 per cent of pre-dive value) than that of cold (5C) acclimated frogs (55 per cent of surface value) following submergence for 1 hr in open tanks at the same intermediate temperature (15C). In the respirometer the 5C acclimated group showed a reduction in oxygen consumption to 70 per cent and heart rate to 82 per cent of the surface values. In the 25C acclimated population both oxygen consumption and heart rate fell to about 55 per cent of the pre-dive level. A comparison of differences in winter and summer animals with differences in warm and cold-acclimated animals indicates that there is more to seasonal variation than mere acclimation to different temperatures. (Oleszkiewicz-Vanderbilt)
W74-04242

INVESTIGATION OF THE MICROFLORA OF SWAMP ORE AND LAKE WATER BY THE METHOD OF ELECTRON MICROSCOPY, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
G. Dubinina, and Z. Derjugina.
Arch Hydrobiol. Vol 71, No 1, p 90-102. 1972. Illus. (English summary).
Identifiers: Bacteria, *Electron microscopy, *Flora, *Iron bacteria, Lakes, *Microorganisms, Morphology, *Swamp ore, Pollutant identification.

Electron and optical microscopy were used to investigate samples of swamp ore from 2 types of swamps and lacustrine freshwater. By electron microscopy a large number of small forms of iron bacteria and a number of interesting forms of microorganisms were revealed and some morphological details were clarified.--Copyright 1973, Biological Abstracts, Inc.
W74-04292

SPECTROPHOTOMETRIC DETERMINATION OF HEXACHLOROBUTADIENE (HCBD) IN SOIL AND WATER, (IN RUSSIAN),
Akademiya Nauk Moldavskoi SSR, Kishinev.
For primary bibliographic entry see Field 5B.
W74-04293

PRELIMINARY DATA ABOUT THE SEASONAL CHANGES AND VERTICAL STRATIFICATION OF PERIPHYTON FROM THE MIDDLE REACH OF THE RIVER DANUBE,
Slovenske Polnohospodarske Akademie, Bratislava (Czechoslovakia). Laboratorium Rybarstva.
M. Ertil, S. Juris, and J. Tomajka.
Arch Hydrobiol Suppl. Vol 44, No 1, p 35-48. 1972. Illus. (English summary).
Identifiers: Algae, Chlorophyll, *Danube River, Littoral zone, *Periphyton, Rivers, *Seasonal, Standing crop, *Stratification(Vertical), Aquatic animals.

The standing crop, chlorophyll a values and species composition of the algae and animals growing on artificial substrates (glass slides with rough surface) in the littoral zone of the river Danube were studied during the course of 1 yr. The artificial substrates were placed at different depths of the littoral zone, which was 6-7 m broad. The growth of the periphyton was limited by the frequent water-level fluctuations and by scouring during the flood. The highest values of the standing crop, as well as the chlorophyll a concentrations, were recorded during the autumn when the water level was relatively constant. The standing crop of algae decreased rapidly with increasing depth, whereas the standing crop of consumers showed a slowly increasing trend. At a depth of about 2.5 m the leveling up of both components was reached.--Copyright 1973, Biological Abstracts, Inc.
W74-04294

DETERMINING THE CATION CAPACITY OF HUMIC SUBSTANCES USING FLAME PHOTOMETRY, (IN ESTONIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Botany.
U. Myal'gi.
Eesti Nsv Tead Akad Toim Biol. Vol 20, No 4, p 353-354. 1971.
Identifiers: *Cation capacity, *Flame photometry, *Humic acids, *Fulvic acids, *Alkali metals, Nitrogen, Phosphorus, Pollutant identification.

Cation capacity of humic and fulvic acids was determined by their content of alkali metals. This method was especially useful for the simultaneous determination of the general N and P content in the same water sample.--Copyright 1973, Biological Abstracts, Inc.
W74-04298

DETERMINATION OF CATION CAPACITY OF HUMIC ACIDS BY THIN ASH CONTENT, (IN ESTONIAN),
Akademiya Nauk Estonskoi SSR, Tartu. Inst. of Zoology and Biology.
U. Myal'gi.
Eesti Nsv Tead Akad Toim Biol. Vol 20, No 4, p 355-356. 1971.
Identifiers: Acids, *Ash, *Cation capacity, *Humic acids, *Pollutant identification.

Humic acid cation capacity calculated by the ash content can be used for a comparative analysis of humic substances in various bodies of water.--Copyright 1973, Biological Abstracts, Inc.
W74-04299

5B. Sources Of Pollution

EFFECT OF POLYESTER FIBER PROCESSING EFFLUENTS ON WATER QUALITY,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 5A.
W74-03761

PRECIPITATION AS A NUTRIENT AND HYDROGEN ION SOURCE FOR FORESTED WATERSHEDS IN THE MISSOULA VICINITY,
Montana Univ., Missoula. School of Forestry.
L. K. Forcier, G. M. Knudsen, and F. H. Omodt.
Availability from NTIS as PB-227 249 $3.25 in paper copy, $1.45 in microfiche. Montana University Joint Water Resources Research Center, Montana State University, Bozeman, Report No 46, December 1973. 34 p, 9 fig, 2 tab, 33 ref. OWRR A-066 MONT(1).

Descriptors: Air environment, *Path of pollutants, Rain gages, *Precipitation(Atmospheric), *Air pollution, *Montana, *Nutrients, Ecosystems, *Forest watersheds, Hydrogen ion concentration, Calcium, Magnesium, Sodium, Potassium.
Identifiers: Precipitation quality, *Missoula Valley(Mont).

The importance of precipitation-borne nutrients and the pH of precipitation to forested ecosystems is described. A sampling network consiting of ten monitoring stations was established in the vicinity of Missoula, Montana, each with two or more collection devices, in the urbanized-industrialized Missoula Valley. Stations were directly downwind from Missoula, in a generally downwind valley, at a downwind intensive eco-system study site, and at an upwind control site. Weekly precipitation samples were collected at most sites, for a period of one year. Results show that bulk precipitation quality (as measured by Ca++, Mg++, Na+, and K+ concentrations) varies spatially as well as with respect to time. Preliminary analysis reveals several trends in the cation data. Concentrations recorded in the Missoula Valley are generally higher than those at the other stations. Additionally, the augmented concentrations appear to decrease rapidly outside Missoula, perhaps remaining higher in the downwind valley for a greater distance than in the direct downwind direction. (Williams-Montana)
W74-03766

THE CHEMISTRY OF CADMIUM IN NATURAL WATER--I: A STUDY OF CADMIUM COMPLEX FORMATION USING THE CADMIUM SPECIFIC-ION ELECTRODE,
Water Pollution Research Lab., Stevenage (England).
J. Gardiner.
Water Research, Vol 8, No 1, p 23-30, January 1974. 3 fig, 4 tab, 14 ref.

Descriptors: *Water chemistry, *Chelation, *Cadmium, Heavy metals, Poisons, Toxicity, Path of pollutants, Polyelectrolytes, *Water pollution sources.
Identifiers: Complex ions.

The extent of formation of labile complexes of cadmium was investigated in synthetic solutions and in samples of natural waters. A substantial proportion of the total cadmium in river and lake water is usually present as the free cadmium ion, and this proportion is larger at low pH values and at low proportions of sewage effluent present in the water. Humic substances usually account for most of the complexation, followed in importance by carbonate. (Knapp-USGS)
W74-03775

THE EFFECTS OF ARTIFICIAL SUNLIGHT UPON FLOATING OILS,
Chelsea Coll. of Science and Technology, London (England). Dept. of Pharmacy.
A. F. Klein, and N. Pilpel.
Water Research, Vol 8, No 1, p 79-83, January 1974. 5 fig, 3 tab, 14 ref.

Descriptors: *Oil spills, *Oxidation, *Water pollution control, Organic compounds, Degradation(Decomposition), Oil pollution.

Samples of hexadecane (of a low boiling fraction from a Tiajuana crude oil and of high boiling fractions from the Tiajuana, a Peruvian and a Libyan Amna crude oil) were irradiated while floating on water with ultraviolet light from a mercury arc. Under these conditions the oils are photo-oxidized and changes occur in their spreading properties and their solubilities in the water. The results are markedly affected by adding to the samples small amounts of naphthol, which acts as a photosensitizing agent. The naphthol increases the solubility of the Peruvian residue and causes a lens of it to spread instead of to contract during irradiation. Photosensitizing agents might be used in practice to accelerate the oxidation of oils by sunlight in the event of spills at sea. (Knapp-USGS)
W74-03777

SELF-DIFFUSION COEFFICIENTS OF SELECTED HERBICIDES IN WATER AND ESTIMATES OF THEIR TRANSMISSION FACTORS IN SOIL,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
H. D. Scott, and R. E. Phillips.
Soil Science Society of America Proceedings, Vol 37, No 6, p 965-967, November-December 1973. 1 tab, 11 ref.

Descriptors: *Diffusion, *Diffusivity, *Herbicides, *Mass transfer, *Soil water movement, *Path of pollutant, Ion exchange, Aqueous solutions.

Self-diffusion coefficients of selected herbicides were measured in aqueous solution by the capillary tube method. The diffusion coefficients were approximately 0.000006 sq cm per sec at 23 deg C and were not particularly related to the configuration of the herbicide molecule. Values calculated for the transmission factors of these herbicides differed; the more mobile compounds were associated with the higher values. (Knapp-USGS)
W74-03778

THE SIMULTANEOUS EFFECT OF PH AND CHLORIDE CONCENTRATIONS UPON MERCURY (II) AS A POLLUTANT,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
H. C. H. Hahne, and W. Kroontje.
Soil Science Society of America Proceedings, Vol 37, No 6, p 838-843, November-December 1973. 8 fig, 2 tab, 25 ref.

Descriptors: *Mercury, *Path of pollutants, *Hydrolysis, *Soil water, *Hydrogen ion concentration, *Chlorides, Water chemistry, Water pollution, Heavy metals, Soil moisture, Clay minerals, Adsorption.

The mercuric ion, compared to other heavy metal pollutants, hydrolyzes at low pH values and forms soluble chloride complexes at low chloride concentrations. To evaluate the possible implications of such behavior in natural aquatic systems, Hg(II) hydroxy and chloride species distributions were calculated using pH and chloride ion concentrations as variables simultaneously. Range in pH values selected was from 2 to 9 to cover conditions encountered in acid mine drainages, rivers, all types of soil solution extracts, and seawater. In addition, montmorillonite, illite, and kaolinite were equilibrated with different HgCl2 solutions. The

range of HgCl2 concentrations in equilibrium solutions was 0.000125M to 0.005M. Chloride complexes compete effectively with the hydroxy complexes of Hg(II). The chloride and hydroxy complexes may contribute appreciably to the mobilization of Hg(II). The mobility of Hg(II) hydroxide is limited by the intrinsic solubility of Hg(OH)2. At pH 4 and 5, chloride ion concentrations of 3.5 and 14 ppm, respectively, are sufficient for all Hg(II) to be in the HgCl2 form. At higher pH values, partial to complete mobilization is possible depending on the prevailing chloride and Hg(II) concentrations. Little or no Hg(II) was adsorbed. The chloride ion concentrations of the equilibrium solutions varied between 1.4 and 14 ppm and pH values ranged from 3.68 to 4.90. (Knapp-USGS)
W74-03782

NATURAL MIXING PROCESSES IN RIVERS,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
W. W. Sayre.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 6, p 6-1--6-37, 1973. 9 fig, 39 ref.

Descriptors: *Mixing, *Path of pollutants, *Streamflow, Rivers, Hydraulics, Dispersion, Diffusion, Turbulent flow, Water quality.

The mechanisms which produce natural mixing in rivers are an important part of the overall transport process for waterborne substances, and therefore of river ecology. Starting with the fundamental three-dimensional convection-diffusion equation, and proceeding on to more tractable mathematical models of longitudinal dispersion, and transverse and vertical mixing, current methods for predicting mixing in rivers are reviewed. Accurate and detailed predictions of mixing are possible for the idealized case of uniform flow in a straight channel of constant cross section wherein the transport properties of the dispersing substance are the same as those of the ambient stream water. In rivers, where conditions of uniform flow in a straight channel of constant cross section are rarely more than roughly approximated, the mixing process is fairly well understood from a qualitative point of view. Because of the wide variety of channel characteristics which exist not only between rivers, but also along the course of any given river, detailed predictions for individual reaches have to be treated (although within the framework of a common mathematical model) as special cases, with some reliance on field measurements of velocity distributions and mixing coefficients. (Knapp-USGS)
W74-03790

MECHANICS OF HEAT TRANSFER IN NON-STRATIFIED OPEN-CHANNEL FLOWS,
Geological Survey, Bay St. Louis, Miss.
H. E. Jobson, and N. Yotsukura.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 8, p 8-1--8-67, 1973. 14 fig, 776 ref.

Descriptors: *Thermal pollution, *Path of pollutants, *Mixing, *Heat transfer, Equations, Cooling, Cooling water, Thermal powerplants, Winds, Evaporation.

The power generation industry is the dominant producer of waste heat. Natural flowing water will always be the most efficient means of dissipating excess heat. The three-dimensional problem was formulated for an open channel flow with uniform depth by writing the conservation equation for thermal energy in terms of turbulent convection and diffusion and by describing the surface transfer as a boundary condition. The two-dimensional equation was then derived by integrating the three-dimensional equation with respect to depth. The surface and hydraulic transfer mechanisms may be combined into one equation without the necessity of assuming a uniform water temperature. Finally the one-dimensional equation was developed by integrating the two-dimensional equation with respect to the width. The one-, two-, and three-dimensional equations are very much similar to, and no easier to solve than, the classical Fickian diffusion equation. However, in the present derivations the water temperature and velocity are not assumed to be uniform in the cross section. For the prediction of natural temperature distributions, as well as excess temperatures in the far field, the one-dimensional equation provides an adequate model. The one-dimensional thermal equation has the same form as the biochamical oxygen demand (BOD) equation. If the depth and velocity are independent of the longitudinal coordinate the equation can be integrated directly. Furthermore, if the excess temperature is needed the equation simplifies to the classical exponential dieaway curve. Excess temperature distributions can be predicted on the basis of wind speed information along, providing that the approximate natural temperature is used as a reference temperature. (Knapp-USGS)
W74-03792

SOME EFFECTS OF WASTES ON NATURAL WATERS,
Vanderbilt Univ., Nashville, Tenn.
P. A. Krenkel.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 9, p9-1--9-41, 1973. 6 fig, 1 tab, 16 ref.

Descriptors: Water pollution, *Water pollution control, *Path of pollutants, Hydraulics, *Waste assimilative capacity, Environment, Thermal pollution, Eutrophication, Mercury.

The problems of water pollution are reviewed briefly and implications with regards to the environment are discussed. A simplified methodology for the determination of the ability of a river to accept organic waste materials is presented. In order to determine the ability of a river to satisfactorily accept a waste discharge, hydraulic and hydrologic parameters that must be delineated include the hydraulic geometry, flow characteristics, the meteorologic characteristics, the detention times, the turbulence characteristics and the drought-frequency analysis. In addition, disposal of waste materials into other water bodies requires special expertise in the hydromechanics of estuaries, lakes and groundwater. (Knapp-USGS)
W74-03793

HEATED SURFACE DISCHARGES INTO FLOWING AMBIENT STREAMS AND LAKES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 5D.
W74-03794

AGRICULTURAL IMPACT ON WATER QUALITY IN WESTERN RIVERS,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
G. V. Skogerboe.
In: Environmental Impact on Rivers (River Mechanics II), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 12, p12-1--12-25, 1973. 5 fig, 1 tab, 15 ref.

Descriptors: *Water pollution sources, *Irrigation, *Return flow, Water pollution effects, Water quality, Path of pollutants, *Salinity, Nutrients, Water pollution control, Pesticides, *Nitrates.

The practice of irrigation has detrimental effects on environmental water quality. Usually, the quality of water draining from irrigated areas is materially degraded in several ways as compared with the water applied. However, irrigation can also produce beneficial water quality effects through denitrification, phosphate reduction in subsurface return flows, and biological improvements. Irrigation return flows are of special concern because irrigated agriculture is the largest consumer of water resources. Throughout the world, a third of the irrigated land is plaqued by salt problems. The major water quality problem resulting from irrigated agriculture is the salt transported to groundwater reservoir and rivers by irrigation return flow. Other problems include the movement of sediments, variable amounts of fertilizers and pesticides, phosphates (which may come from fertilizers), and increased bacterial content in surface return flows. Subsurface return flows frequently show considerable increase in salts, including nitrates, but show a reduction in bacteria. (Knapp-USGS)
W74-03796

DISPERSION OF CONTAMINANTS ATTACHED TO SEDIMENT BED LOAD,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. W. Shen, and H-F Cheong.
In: Environmental Impact on Rivers (River Mechanics, III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 13, p 13-1--13-48, 1973. 20 fig, 2 tab, 6 ref.

Descriptors: *Path of pollutants, *Bed load, *Dispersion, *Sediment transport, Radioactive wastes, Stochastic processes, Statistics, Statistical methods, Alluvial channels.

Contaminants such as herbicides, pesticides, and radioisotopes can attach to sediment particles and move as bed load in a flow. Unlike those contaminants which are dissolved in the flow and moved rapidly by the flow velocity, these bed load particles with contaminants attached are dispersed rather slowly and can be a health hazard. Stochastic models describe the unidirectional movement of a sediment particle which advances in a series of alternate rest and transport periods. Current theoretical and experimental evidence indicate that the step lengths are gamma distributed with the shape parameter varying between one and three, and the rest periods are exponentially distributed. The dispersions of contaminated particles released instantaneously and continuously from a line source in the bed of a straight channel with steady, uniform flow were analyzed. The concentration distribution function is initially highly skewed and becomes progressively symmetrical with time. After a long dispersion time, the peak varies as the inverse square foot of the time. The location of the peak advances slightly faster than the mass center and they are almost coincident after a long time has elapsed. A simplified procedure of approximating the envelope of the family of distribution curves for a specified run yields a curve that is uniformly lower than the envelope. With an instantaneous introduction of contaminants, the time concentration distributions are highly skewed near the source and become progressively more symmetrical far downstream where they can be approximately represented by a Gaussian curve. With radioactive contaminants, the absorption rate is given by the inverse square law. (Knapp-USGS)
W74-03797

CHEMICAL AND BIOLOGICAL SURVEY OF THE SAVANNAH RIVER ADJACENT TO ELBA ISLAND,
Skidaway Inst. of Oceanography, Savannah, Ga.
R. R. Stickney, and D. Miller.
Georgia Marine Science Center Technical Report Series No 73-3, February 1973. 68 p, 26 fig, 13 tab, 5 ref.

Descriptors: *Baseline studies, *Water quality, *Natural gas, *Water temperature, *Georgia, Rivers, Water pollution control, Oil industry, Cooling water, Return flow, Environmental effects, Ecology, Ecosystems, Aquatic life, Data collections, Tidal effects, Water pollution sources.
Identifiers: Savannah River(Ga).

This study was supported by a grant from the Southern Natural Gas Company which plans to construct a regassification plant on Elba Island, Georgia, in the Savannah River where liquified natural gas (LNG) will be off-loaded from ships, regassified and piped to distribution centers. The initial plan called for water from the Savannah River to be pumped into the plant where it would be used to carry away the thermal debt incurred in converting the LNG from the liquid to the gaseous state. The process water, when returned to the river, was expected to be cooled approximately 5 deg F below ambient river temperature. No other changes in or additives to the process water were contemplated. Information is presented on the basic water chemistry and faunal assemblages in the river adjacent to Elba Island prior to construction of the plant. The study is intended to provide a data base for the water quality and biota in this section of the river under presently existing conditions of pollution from domestic, municipal and industrial sources against which any environmental effects of the regassification operation may be measured in the future. (Woodard-USGS)
W74-03804

WATER RESOURCES MONITORING AND EVALUATION--A KEY TO ENVIRONMENTAL PROTECTION IN ALABAMA OIL FIELDS,
Geological Survey, Tuscaloosa, Ala.
W. J. Powell, M. E. Davis, B. L. Bailey, and E. R. German.
Alabama Geological Survey Information Series 44, 1973. 82 p, 29 fig, 6 tab, 3 ref.

Descriptors: *Water pollution sources, Oil industry, *Monitoring, *Water quality, *Alabama, Surface waters, Groundwater, Control systems, Data collections, Water pollution control, Oily water, Chemical analysis, *Oil fields, *Oil pollution.

A monitoring program is being maintained in all principal oil fields in Alabama. The purpose of the monitoring program is to maintain surveillance on the chemical character of groundwater and surface water in the vicinity of the principal oil fields. This program is the first of its kind in the nation, and the results to date have been beneficial in early detection of areas of possible pollution. Emphasis is on significance of changes in quality of water in the Pollard, Citronelle, Gilbertown, and South Carlton oil fields. (Woodard-USGS)
W74-03807

SELENIUM IN NEBRASKA'S GROUNDWATER AND STREAMS,
Geological Survey, Lincoln, Nebr.
R. A. Engberg.
Nebraska Water Survey Paper No 35, December 1973. 42 p, 7 fig, 2 tab, 17 ref.

Descriptors: *Water pollution sources, *Trace elements, *Water chemistry, *Water analysis, *Nebraska, Sampling, Surface waters, Groundwater, Chemical analysis, Analytical techniques, Data collections, Public health, Water quality standards, Water quality control.
Identifiers: *Selenium.

Selenium is poisonous to animals and can be fatal if ingested in large amounts. It also is an essential micronutrient for good health. The U.S. Public Health Service recommended maximum permissible concentrations of 10 micrograms per liter of selenium of public water supplies. Selenium content was determined from 139 groundwater sites and 39 surface-water sites in Nebraska. Most of the samples were obtained from known seleniferous areas. Measurable selenium concentrations were detected in water from some areas not previously suspected to be seleniferous. Concentrations greater than 10 micrograms per liter were found in 40.3% of all groundwater samples analyzed. At two locations, selenium concentrations in groundwater were significantly high--103 micrograms per liter from a well in northern Phelps County were high concentrations had not been expected and as high as 480 micrograms per liter in eastern Boyd County were high concentrations had been anticipated because the shale bedrock is known to be seleniferous. The highest observed concentration of selenium in surface water was 20 micrograms per liter at two widely separated locations. (Woodard-USGS)
W74-03813

THE HYDRAULICS OF ARTIFICIAL RECHARGE,
Technische Hogeschool, Delft (Netherlands).
For primary bibliographic entry see Field 4B.
W74-03820

BOREHOLE RECHARGE: THE COMPATABILITY OF RECHARGE WATER WITH THE AQUIFER,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4B.
W74-03822

CLOGGING IN RECHARGE WELLS, CAUSES AND CURES,
Geological Survey, Little Rock, Ark.
For primary bibliographic entry see Field 4B.
W74-03824

TREATMENT OF OILY AND METAL-CONTAINING WASTEWATER,
Weston (Roy F.), Inc., West Chester, Pa.
Y. H. Lin, and J. R. Lawson.
Pollution Engineering, Vol 5, No 11, p 45-48, November 1973. 4 tab.

Descriptors: *Waste water(Pollution), Properties, *Oil wastes, *Industrial wastes, *Water pollution sources, Liquid wastes, Effluents, Chemical wastes, Oily water, Ion exchange, Oxidation, Reverse osmosis, Sedimentation, Emulsions, Oil, Biochemical oxygen demand, Diary industry, Chemical oxygen demand, Suspended solids, Phenols, Ammonia, Activated sludge, Chromium, Heavy metals, Iron, Copper, Cadmium, Zinc, Molybdenum, Nickel.
Identifiers: *Metal wastes, Silver, Cyanides, Textile industry, Petroleum refineries, Electroplating wastes, Arsenic, Barium, Selenium, Steel industry, Vegetable oil, Air flotation, Aircraft manufacturing industry, Shipbuilding industry, Automobile industry, Bilge water, Ballast water.

Data are presented in a tabular form which cover the major sources of oily and metal-containing wastes, characteristics of selected industrial wastewaters, and effluent concentrations after various methods of waste treatment. (Holoman-Battelle)
W74-03852

CHANGES IN CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF A HEAVY RESIDUAL OIL WEATHERING UNDER NATURAL CONDITIONS,
Nova Scotia Technical Coll., Halifax.
O. J. Betancourt, and A. Y. McLean.
Journal of the Institute of Petroleum, Vol 59, No 569, p 223-230, September 1973. 5 fig, 2 tab, 10 ref, append.

Descriptors: *Oil pollution, *Weathering, *Oil spills, *Degradation(Decomposition), *Canada, Density, Viscosity, Nickel, Sulfur, Time, Heavy metals, Sampling, Analytical techniques, Aging(Physical).
Identifiers: *Chedabucto Bay(Nova Scotia), Asphaltenes, Vanadium, Bunker C oil, Fate of pollutants.

An oil spill from the tanker Arrow in Chedabucto Bay, Nova Scotia, in 1970 provided an opportunity to study changes in properties of oil over a 2-year period subsequent to the spill. The indicators of weathering used were viscosity, density, asphaltene content, and the concentration of nickel, vanadium, and sulfur. The main conclusions were: (1) The ratio of the concentrations of vanadium and nickel in an oil sample appears to be unaffected by the age of the sample. (2) Compounds containing vanadium and nickel in the fuel oil studied do not appear to be affected by weathering to any significant extent. (3) The composition of residual fuel oil is altered on weathering by evaporation and other processes, possibly biodegradation and solution. (4) The effect of the weathering processes is not great in terms of total loss of material and was less than 20 per cent after 18 months. (5) The rate of weathering is rapid, although erratic, in the early months after a spill. After approximately one year the rate of change is much reduced suggesting that the oil on the shore will remain for several years unless removed by mechanical means. (6) Asphaltene concentration rises as the result of weathering processes. This is associated with a corresponding rise in viscosity which suggests that if asphaltene concentration could be increased artificially, the movement of shore bound oil could be restricted. (Mortland-Battelle)
W74-03877

MIXED CULTURE BIOOXIDATION OF PHENOL. I. DETERMINATION OF KINETIC PARAMETERS,
State Univ. of New York, Buffalo. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5C.
W74-03879

MIXED CULTURE BIOOXIDATION OF PHENOL. II. STEADY STATE EXPERIMENTS IN CONTINUOUS CULTURE,
State Univ. of New York, Buffalo. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5C.
W74-03880

THE CHARACTERIZATION AND INFLUENCE OF DOMESTIC DRAIN EFFLUENTS ON THE RED CEDAR RIVER,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
A. R. Talsma.
Available from the National Technical Information Service as PB-227 664; $9.75 in paper copy. M.S. Thesis, 1972. 119 p, 17 fig, 13 tab, 61 ref, 4 append. OWRR C-3381(3023)(6). 14-31-0001-3723.

Descriptors: Alkalinity, Hardness(Water), Chlorides, Detergents, Phosphorus, Nitrogen, Ammonia, Dissolved solids, Temperature, Fluorescent dye, Bioassay, Effluents, *Monitoring, Hydrogen ion concentration, *Michigan, Benthic fauna, *Storm drains, Dissolved oxygen, Carbon, Conductivity, *Domestic wastes.
Identifiers: *Red Cedar River(Mich), Pollution monitoring, Ammonia-nitrogen.

A study was undertaken to monitor pollutants entering the Red Cedar River of central Michigan, and to determine their effects on the ecosystem. Dissolved oxygen, conductivity, phosphorus, nitrogen, carbon, suspended solids, chlorides and

detergents were among the chemical parameters considered. Bioassays, live cars , bottom fauna and coliform analyses were the biological aspects of interest. Analyses indicated that pollutants were principally of domestic origin, coming from storm drains and combined storm and sanitary drains. Significant differences were found in water quality and river fauna above sources of pollution as compared with below sources. Most parameters showed little or no improvement since 1964.
W74-03895

NITRATE LEACHING IN SOIL ON RUTGERS AGRICULTURAL RESEARCH CENTER AT ADELPHIA, NEW JERSEY,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Soils and Crops.
O. J. Gillings.
Available from the National Technical Information Service as PB-227 610; $9.25 in paper copy, $1.45 in microfiche. M.S. Thesis, January 1973. 117 p, 38 fig, 27 tab, 45 ref. OWRR A-027-NJ(3). 14-01-0001-3030.

Descriptors: *Fertilizers, Groundwater, Runoff, *Nitrates, *Leaching, Nitrites, *Nitrogen compounds, Water pollution sources, Ammonia, *New Jersey, *Soil water, *Path of pollutants.

An experiment was designed to find out if under normal agricultural practices, nitrogen fertilizers may pollute water. Nitrogen fertilizers, in the form of nitrate or ammonium, were applied to field plots and sorgham and beets grown. Suction lysimeters were used to sample soil water at the one, four and nine foot depths and surface runoff was sampled. Nitrate, nitrite, and ammonium were determined in these samples. More nitrogen was lost to both surface runoff and deep leaching from broadcast fertilizers than from drilled fertilizers. Little difference in the levels of nitrogen (nitrate plus ammonium) in soil water was found between nitrate and ammonium fertilizers. The largest deep leaching of nitrates occurred in the fall and in the spring. The amount leached was proportional to the amount of nitrogen applied. When 175 kg. N/ha was applied, the average (of three replications) amount of nitrate found in soil water at the nine foot depth was six to nine ppm. nitrogen. At the four foot depth nitrate nitrogen varied from one to nine ppm. nitrogen when treatment ranged from no nitrogen to 175 kg. N/ha. (Douglas-New Jersey)
W74-03897

MERCURY: UPTAKE BY THE GOLDFISH, CARASSIUS AURATUS, FROM LOW CONCENTRATIONS IN WATER AND ITS TISSUE DISTRIBUTION,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W74-03898

A COMPARISON OF INVERTEBRATE DRIFT IN THREE MICHIGAN STREAMS,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
L. D. Eyman.
Available from the National Technical Information Service as PB-228 145; $5.75 in paper copy, $1.45 in microfiche. M.S. Thesis, 1969. 44 p, 8 fig, 4 tab, 24 ref. OWRR C-3381(3723)(3) and C-1663(3153)(3).

Descriptors: *Benthos, *Invertebrates, *Drift, *Littoral drift, *Bottom sampling, Standing crops, Velocity, *Michigan.
Identifiers: Jordan River(Mich), Au Sable River(Mich), Red Cedar River(Mich), Baetis spp, Simulium spp, Hyclella azteca.

The purpose was to measure the rate of drift in three contrasting streams and determine what relationship exists between drift rate and degree of enrichment. Additionally an attempt was made to determine how drift is related to current velocity. The three streams were the Jordan River in Antrim County, Au Sable River in Crawford County, and Red Cedar River in Ingham County. Two 24-hour series of drift samples were collected in each stream. Samples of benthic invertebrates were collected following each 24-hour drift collecting period. To investigate the relationship of current velocity to drift rate, five series of samples were collected along a transect across the stream at three points where the velocity was different. Although standing crop estimates did not reflect the degree of enrichment in the streams, total drift measurements showed a relationship to enrichment. The relationship between total drift and current velocity was linear, as expected. However, the drift rate of Baetis sp. and Simulium sp. appeared to be influenced by behavioral as well as physical factors and was therefore non-linear. Methods for sampling drift are discussed with suggestions for standardization of technique.
W74-03902

POTAMOLOGICAL EFFECTS OF FISH HATCHERY DISCHARGE ON THE JORDAN RIVER, NORTHERN LOWER MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W74-03903

THE DYNAMICS OF BROWN TROUT (SALMO TRUTTA) AND SCULPIN (COTTUS SPP.) POPULATIONS AS INDICATORS OF EUTROPHICATION,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W74-03904

RESIDUAL INFORMATION MODEL WITH APPLICATION TO HEAT FROM THERMAL POWER PLANTS,
Auburn Univ., Ala. Dept. of Economics.
M. M. Baker.
In: Social Accounting Approaches to Water Resource Use in Economic Development, Auburn Univ., Alabama, School of Business Research Series 3, p 41-89, August 1972. 15 fig, 33 ref.

Descriptors: *Model studies, *Wastes, *Costs, *Economics, *Thermal pollution, Pollutants, Attitudes, Decision making, Thermal powerplants, Beneficial use.
Identifiers: *Residual information model, Waste heat, Public response, Russell-Spofford model, Thermal by-products.

Varying residual levels and forms result from alternative combinations of production, protection, and recipient reaction decisions. A Residual Information Model is developed from the Russell-Spofford model and applied to the problem of residual heat created by steam electric plants. In production processes, technical and raw material choices using either fossil or nuclear fuel generate varying residuals including heat. While nuclear fuel is cheaper and produces less residuals other than heat, higher capital costs and heat residuals are created. Protection decisions include recycling, by-product production, and treatment of residuals before expelling them into the environment. While a number of by-products are explored, only heating and air conditioning are considered feasible. Four measures--once-through freshwater cooling, cooling pools, evaporating cooling towers, and non-evaporating cooling towers, ranking from cheapest to most expensive respectively--were considered. The environmental cost ranking is obtained by reversing the first and fourth alternatives. After treatment, the remaining residuals have varying effects on people, plants, animals, and inanimate objects through water condensation and heat exchange in the air. Negative reactions to residual heat are revealed by increased monitoring, changes in plant location, and increased demand for regulation of power plants. (See also W74-03907) (Schroeder-Wisconsin)
W74-03911

POLLUTION OF DRINKING WATER BY OIL IN THE PIPES OF NEW BUILDINGS, (IN GERMAN),
Erlangen-Nuremberg Univ. (West Germany). Inst. for Hygiene and Medical Mikrobiology.
W. Graef, W. Knapp, and K. Wartenberg.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 155, No 5, p 350-359, 1972. Illus. (English summary).
Identifiers: Buildings, *Oil pollution, *Pipes, Pollution, *Potable water, Water pollution sources, Public health.

Non-canalized water can be polluted by mineral oils. Little attention has been given to and few complaints are heard about the pollution of household tap water through the use of prohibited mineral oils for cutting threads on pipes and joining them together. Four relevant cases are reported, in which a varying oil content and a penetrating, nauseous smell was found in samples of water taken after it had passed through the meter. Local investigations, the dismantling of water pipes and threaded unions and detailed chemical analysis proved that an oil containing organic sulfur compounds had been used for cutting threads and moistening hemp packings, and that its decomposition products had made the water unfit to drink. It was ascertained that, after complaints had come to their notice, the suppliers put a cutting lubricant of different composition on the market under the same brand name.--Copyright 1973, Biological Abstracts, Inc.
W74-03950

LOOKING FOR POLLUTION UNDER THE EARTH,
L. A. Purrett.
Science News, Vol 103, p 78, February 3, 1973. 1 photo.

Descriptors: *Water pollution, *Aquifers, *Fertilizer, *Soil tests, *Model studies, *California, Water table, Nitrates, Denitrification, Nitrogen, Irrigation, Aeration, Soil analysis, Water pollution control, Water quality.

Researchers at the University of California intend to drill holes at selected sites, and through soil analysis, will develop a computer model to predict how much pollution results from a given application of nitrogen fertilizer. Any nitrogen fertilizer can be oxidized under the right conditions to form nitrates, and the problem is compounded in California by the extensive use of irrigation, which can aggravate the nitrate pollution problems by washing the nitrates down to the water table. Factors such as the amount of nitrogen initially going into the soil, the amount of water applied, the permeability of the soil, the type of crop the fertilizer is applied to, the presence of organic matter which can reduce the nitrate and the aeration of the soil influence how much nitrate eventually reaches the water table. An analysis of these factors will enable the benefits of fertilizer use to be balanced against the hazards of soil and water pollution, which in turn will permit guidelines showing farmers how to increase food production without polluting water supplies. (Ritchie-Florida)
W74-04004

CATASTROPHE BREWING IN QUIET WATERS,
National Wildlife Federation, Washington, D.C.
E. Chaney.
National Wildlife, Vol 9, p 4-7, August-September 1971. 1 photo.

Descriptors: *Water, *Water pollution, *Mercury, *Water pollution sources, Public health, Toxicity, Pesticides, Industrial wastes, Dredging, Chemical wastes, Effluents, Mining, Water pollution effects, Fishkill, Mortality, Water quality, Heavy metals, Fish, Non-game birds, Mammals, Water birds, Wildlife.

Despite extensive government activity to halt its discharge, following discovery of high concentrations of mercury in fish from border waters, the mercury disaster still exists. Mercury has been found in fish, game birds, whales and seals, and environmental mercury contamination may be irreversible. While mercury comes in an incredible variety of compound forms, its major sources are natural geologic formations, industrial discharges, pesticides, mining residues, fossil fuel burning and miscellaneous garbage. Although the human body excretes mercury slowly, there is ample time for it to cause fatigue, lethargy and irritability as well as brain and genetic damage. A special federal task force concluded that even with complete, immediate elimination of discharges, existing deposits of mercury in sediments will continue to yield highly toxic methylmercury for decades. Alternatives proposed for removal of mercury deposits include covering the bottoms of contaminated waterways with absorptive materials like ground quartz or silicates, burying the bottoms under rocks, and removing the contaminated bottoms by dredging or pumping. (Ritchie-Florida)
W74-04025

A BRIEF WATER-RESOURCES APPRAISAL OF THE TRUCKEE RIVER BASIN, WESTERN NEVADA,
Geological Survey, Carson City, Nev.
For primary bibliographic entry see Field 4A.
W74-04047

EFFECTS ON WATER QUALITY IN THE SHALLOW AQUIFER DUE TO THE OPERATION OF THE CROSS STATE DUMP, PALM BEACH COUNTY, FLORIDA,
Geological Survey, Tallahassee, Fla.
J. J. Schneider.
Open-file report 73011, 1973. 42 p, 11 fig, 3 tab, 1 ref.

Descriptors: *Water pollution sources, *Garbage dumps, *Water quality, *Groundwater, *Florida, Data collections, Chemical analysis, Water analysis, Water levels, Bacteria, Pesticides, Geology, Groundwater movement, Leachate, Ecology, Path of pollutants.
Identifiers: Palm Beach County(Fla).

Leachate from the Cross State Dump, Palm Beach County, Florida, has impaired the quality of the water at shallow depth in the aquifer in the immediate vicinity of the dump. The impairment has been minimal at producing wells a quarter mile south and east of the dump. The influence of the dump on the groundwater to the north and west could not be determined due to a natural decline of groundwater quality in these directions. The water table in the immediate dump area slopes downward in all directions towards the surrounding canals. The canals to the west, north, and east of the dump drain into the south canal which is the West Palm Beach Canal. There is no indication that the leachate has materially affected the water quality in the West Palm Beach Canal. The findings are based on information obtained from 22 wells and 10 canal sites from August 1970 through March 1972. (Woodard-USGS)
W74-04052

NITROGEN AND PHOSPHORUS LOSSES IN SURFACE RUNOFF FROM AGRICULTURAL LAND AS INFLUENCED BY PLACEMENT OF BROADCAST FERTILIZER,
Agricultural Research Service, Morris, Minn. North Central Soil Conservation Research Center.
For primary bibliographic entry see Field 5C.
W74-04096

GENERALIZED SIMULATION MODELS FOR MASSACHUSETTS STREAMS,
Quirk, Lawler and Matusky Engineers, Tappan, N.Y.
H. H. Yeh, M. J. Skelly, and J. P. Lawler.
Journal of the Boston Society of Civil Engineers, Vol 60, No 3, p 107-132, July 1973. 7 fig, 5 tab, 10 ref.

Descriptors: *Water pollution control, *Simulation analysis, Streams, Rivers, *Massachusetts, *Water quality, *Computer models, Dissolved oxygen, Biochemical oxygen demand, Management, Planning, Dams, Systems analysis, *Waste assimilative capacity.
Identifiers: Streeter-Phelps equation, *Housatonic River Basin(Mass).

Presented is a generalized stream simulation model developed to provide the Division of Water Pollution Control of the Commonwealth of Massachusetts with the in-house capability to evaluate the assimilative capacities of Massachusetts' streams and rivers. Based on a modification of the Streeter-Phelps equation, the model can be used to predict BOD and DO profiles in a stream and to determine the fate of other pollutants. Moreover, it is useful in ascertaining the location of sampling stations and in planning waste treatment facilities. The generalized stream model stems from the basic concept that the BOD and DO profiles of a waterway can be generated by repeatedly solving BOD and DO models for a series of generalized reaches. This process is called the 'multiple-reach' technique. The model was verified with Housatonic River (Mass.) data and its generality is currently being tested in applications to other streams and rivers in the Commonwealth; nitrogenous oxidation and diurnal variation of photosynthesis are included in these studies. The results are reported as being very satisfactory. (Bell-Cornell)
W74-04118

MOVEMENT OF NITRATES UNDER IRRIGATED AGRICULTURE,
Nebraska Univ., Lincoln. Coll. of Engineering and Architecture.
D. M. Edwards, P. E. Fischbach, and L. L. Young.
Transactions of the ASAE (American Society of Agricultural Engineers), p 73-75, 1972. 6 fig, 14 ref.

Descriptors: *Irrigation effects, *Soil water movement, *Fertilizers, *Water pollution sources, Chemical wastes, Nitrogen compounds, Soil amendments, Water pollution, Soil chemistry, Soil moisture, Water quality, Infiltration, Percolation, Subsurface flow, Unsaturated flow, *Path of pollutants.

Nitrate-nitrogen movement within runoff water was monitored under irrigation conditions. The placement of nitrogen-bearing fertilizers at various depths in the soil is examined with respect to the movement of the resultant nitrates in the unsaturated zone. Once nitrates move below the soil surface they do not re-enter the run-off water. Nitrates move essentially with the wetting front when the soil is initially dry. Nitrates do not move at the same rate as the water when the soil is initially saturated. A run-off water re-use system is required to prevent pollution of surface water if runoff occurs from an irrigated field when nitrogen fertilizer is injected into the influent water. With a properly designed and managed irrigation system little or no movement of nitrates outside the root zone should occur. (Muller-Arizona)
W74-04139

THE 'TENACIOUS' IRON BACTERIA,
Universal Oil Products, St. Paul, Minn. Johnson Div.
G. A. Stott.
Johnson Drillers Journal, p 4-6, July-August, 1973. 6 fig, 9 ref.

Descriptors: *Groundwater, *Wells, *Iron bacteria, Sphaerotilus, Aquatic bacteria, *Water treatment, *Chlorination, Chemical reactions, Acidity.
Identifiers: Siderocapsa, Gallionella, Crenothrix, Clonothrix, Leptothrix, *Acid treatment.

Iron bacteria are examined from the following standpoints: origin, presence in ground water, methods of classification, methods of identification, methods of sample collection, effects on wells and distribution systems, and methods of treatment. Iron bacteria include those that precipitate ferric hydroxide from solutions of ferrous bicarbonate, those that do not require ferrous bicarbonate for their vital processes, but that cause the deposition of ferric hydroxide when either inorganic or organic salts are present, and those that attack iron salts of organic acids. Plugging and decreased hydraulic efficiency result in well and distribution systems, and suggested treatment follows a three-step process of shock chlorination, acid treatment, and a final shock chlorination. (Campbell-NWWA)
W74-04143

EFFECTS OF DEICING CHEMICALS UPON GROUND AND SURFACE WATERS (INITIAL PROGRAM DEVELOPMENT),
Massachusetts Dept. of Public Works, Wellesley Hills. Research and Materials Section.
L. C. Stevens, Jr.
Journal of the New England Water Works Association, Vol 87, No 1, p 1-7, March, 1973.

Descriptors: *Water quality, Water pollution sources, Chemical wastes, Statistical methods, *Mathematical models, Groundwater movement, *Soil water movement, *Massachusetts.
Identifiers: *Deicing salts.

The Massachusetts Department of Public Works has been actively engaged in salt studies for approximately 10 years. Research reports and abstracts have been monitored throughout the whole field of deicing chemicals, to include studies on effective substitutions for sodium and calcium chloride and the effects of chlorides on the environment, plants and animals. Up till now there has been very little done, however, on the effect of deicing chemicals upon water quality. A new study to investigate the composition of water sources near roadsides as affected by deicing salts is envisioned. The research approach is two-fold. First is a statistical analysis of available data and second, controlled environmental experimentation with the objective to isolate and study the mechanics and transport of highway deicing chemicals. The transport mechanics are to be related to a variety of geologic, hydrologic and highway maintenance conditions with an overall goal to develop a predictive relationship in time and space. (Hunt-NWWA)
W74-04149

FARM GROUND WATER NITRATE POLLUTION - A CASE STUDY,
Illinois State Water Survey, Urbana.
W. H. Walker, T. R. Peck, and W. D. Lembke.
Presented at American Society of Civil Engineers Annual and National Environmental Engineering Meeting, October 16-22, 1972, Houston, Texas. Preprint Number 1842, 29 p, 8 fig, 13 ref. $0.50.

Descriptors: Water quality, *Water supply, Wells, Groundwater, Storm-runoff, *Groundwater movement, *Nitrates, Aquifer characteristics, *Illinois, *Farm wastes, *Water pollution sources.
Identifiers: Farm-supply wells, Chemical contamination, Pollutant migration.

Increases of nitrates (NO3) in groundwater caused either directly or indirectly by man's activities

have been a special area of concern because of this chemical's suspected harm to children if concentrated in drinking water supplies in excess of 45 ppm NO3. Many Illinois farm groundwater supply samples analyzed by Water Survey chemists contain from 100 to 1000 ppm, and one recent sample contained 6000 ppm nitrate. The primary sources of excessive nitrate in most affected groundwater supplies investigated has proved to be animal and human waste and nitrogen fertilizer. Nitrate is readily dissolved in precipitation which falls upon such areas and is carried by this water into surficial groundwater aquifers during the groundwater recharge periods of late fall and early spring. In Illinois, practically all recharge to groundwater reservoirs occurs during this part of the year. When the nitrate-rich recharge water enters an aquifer within the cone of influence of a pumping well, in time it will move through the aquifer to that well. In unpumped aquifers, the polluted water moves through the water-bearing material to some nearby subsurface drainage structure, and perhaps leaves the area undetected several days, months, or years after its initial entry into the aquifer. A detailed study of the nature of groundwater nitrate pollution from farm-derived sources that was begun in the summer of 1971 is presented. (Hunt-NWWA)
W74-04158

DISCHARGE AND FLOW DISTRIBUTION, COLUMBIA RIVER ESTUARY,
Geological Survey, Bay St. Louis, Miss.
G. A. Lutz, D. W. Hubbell, and H. H. Stevens, Jr.
Available from NTIS, Springfield, Va., as Rept. No. TID-26445. $5.45 per copy, $1.45 microfiche. Report No. TID-26445, 1973. 79 p, 18 fig, 7 tab, 2 append.

Descriptors: *Columbia River, Water flow, River flow, *Estuary, *Flow measurement, *Discharge measurement, Dispersion, *Distribution, Nuclear powerplants, Effluents, Radioactivity, Waste disposal, Ion transport, Sediment, Biota, *Washington.
Identifiers: Richland(Wash).

Low-level radioactive wastes were discharged into the Columbia River at the Hanford Reservation, U.S. Atomic Energy Commission, near Richland, Washington, from the time of the initiation of nuclear-reactor operations in 1944 until early in 1971. The wastes resulted primarily from the neutron activation of chemical constituents in treated Columbia River water that was used to cool the nuclear reactors. Once the radionuclides were released to the river environment they remained in solution or became associated with sediment or stream biota. Although much of the radioactivity decayed, some radionuclides were transported by the associated media downstream and ultimately reached the Columbia River estuary and thence the Pacific Ocean. One of the purposes of this investigation was to define rates of transport of radionuclides at cross sections along the longitudinal axis of the estuary. The equipment and techniques are described that were used to obtain measurements of the flow, the mathematical models utilized to determine discharges at two different cross sections are discussed, discharge data are presented, and the nature of circulation patterns in the vicinity of Astoria, Oregon is discussed. (Houser-ORNL)
W74-04172

ENVIRONMENTAL SURVEILLANCE FOR RADIOACTIVITY IN THE VICINITY OF THE CRYSTAL RIVER NUCLEAR POWER PLANT: AN ECOLOGICAL APPROACH,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
W. E. Bolch, and J. C. Lochamy.
Progress Report, submitted to Florida Power Corp., St. Petersburg, Fla., Oct 1973. 39 p, 3 fig, 3 tab.

Descriptors: Surveys, *Florida, *Gulf of Mexico, *Radioactivity, *Aquatic life, Ecology, Ecosystems, Sampling, Data collections, Analytical techniques, Model studies, *Path of pollutants, Food chains, Public health, Water pollution sources.
Identifiers: *Surveillance program, Dose to man, *Crystal River(Fla).

This contract began in August of 1970 with a team of seven faculty members representing the departments of Environmental Engineering, Zoology, Nuclear Engineering, Radiation Biophysics, and Aquatic Sciences and six graduate students. The basic theme was to recognize that there were numerous and complex pathways by which radionuclides may cause exposure to plant life, animals and man, and to design the study with due regard to ecological principles. The specific objectives included baseline radioactivity measurements, pathway identification and description, method and procedure development, data analysis, public relations and training. In later contracts, model predictions of dose to man was added as a specific objective. Activities and data accomplished through about July 1, 1973 are presented. (Houser-ORNL)
W74-04173

INTERIM ENVIRONMENTAL MONITORING REPORT: JANUARY-JUNE 1973,
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 5A.
W74-04174

COMPARISON OF MEASURED AND CALCULATED RADIATION EXPOSURE FROM A BOILING WATER REACTOR PLUME,
New York Operations Office (AEC), N.Y. Health and Safety Lab.
C. V. Gogolak.
Available from NTIS, Springfield, Va., as Rept. No. HASL-277, $4.00 per copy, $1.45 microfiche. Report No. HASL-277, Sept 1973. 24 p, 6 fig, 8 tab, 10 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Gases, *Measurement, Assay, Radioactivity, Experimental models, Computer models, Evaluation, Performance, Meteorology, Radioisotopes, Economics, Comparative benefits, Model studies, Nuclear reactors.
Identifiers: *Plumes, *Boiling water reactor.

The availability of new techniques for measuring gamma-ray exposure in the vicinity of nuclear facilities has made possible a critical comparison of measured and calculated plume exposures. The results of such comparisons indicate that models based on the assumption of a Gaussian concentration distribution of radionuclides in the plume predict the gamma radiation exposure to better than a factor of two. The effect on the predicted exposure of approximating various input parameters and simplifying cloud integrations is often critically dependent on the particular radionuclides and meteorological conditions under consideration. Further work is planned on determining the behavior of plume exposure models under specific meteorological conditions for a larger volume of experimental comparisons, to more accurately establish the limits of error of the model calculations. The choice of model can then be made considering the degree of accuracy required and the cost of obtaining that accuracy in computer time. (Houser-ORNL)
W74-04175

ENVIRONMENTAL RADIOACTIVITY - ISPRA 1971,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
M. de Bortoli, and P. Gaglione.
Available from NTIS, Springfield, Va., as Rept. No. EUR-4944e. $4.00 per copy, $1.45 microfiche. Report No. EUR-4944e, April 1973. 48 p, 11 fig, 24 tab, 6 ref.

Descriptors: *Monitoring, *Environment, *Radioactivity, *Assay, Measurement, Air pollution, Water pollution, Water pollution sources, Soil contamination, Fallout, Surface waters, Strontium, Cesium, Milk, Fish, Food chains, Public health, Dusts, Hydrogen ion concentration, Rain.
Identifiers: *Italy.

The 1971 activity is reported of the site survey group of the Protection Division at the Euratom Joint Research Centre - Ispra Establishment. The group works on the radiation protection of the population concerned by the radioactive effluents of the Establishment; during 1971 some measurements have been started on non-radioactive pollution also. Results are presented of the measurements carried out directly on the effluents as well as in the environment in order to assess the contribution by the Establishment to the population dose and the pre-existing radiation and contamination levels of natural origin and those due to worldwide fallout. The results of the determinations carried out in the field of non-radioactive pollution are also reported. Radioactivity in air, precipitation, surface and underground waters, and herbage are given. (Houser-ORNL)
W74-04176

DOSE ESTIMATIONS FOR THE HYPOTHETICAL USE OF NUCLEARLY STIMULATED NATURAL GAS IN THE CHEROKEE STEAM ELECTRIC STATION, DENVER, COLORADO,
Oak Ridge National Lab., Tenn.
R. E. Moore, and C. J. Barton.
Available from NTIS, Springfield, Va., as Report. No. ORNL-TM-4026. $4.00 per copy, $1.45 microfiche. Report No. ORNL-TM-4026, Oct 1973. 39 p, 3 fig, 5 tab, 19 ref, append.

Descriptors: *Tritium, Hydrogen, *Radioactivity, *Assay, Effluent, Nuclear powerplants, Population, Public health, Absorption, Toxicity, *Natural gas, *Colorado, Nuclear explosions, Underground secondary recovery(Oil), *Computer programs.
Identifiers: Denver(Colo).

Whole-body radiation doses to man due to tritium were estimated for hypothetical exposures to stack gases discharged from the Cherokee Steam Electric Station in the Denver area burning 94 million cubic feet per day of nuclearly stimulated natural gas containing 10 pCi per cu cm of tritium. The highest dose that might be received by any person outside the plant area was estimated to be 0.0056 millirem/year. This value includes 0.0047 millirem/year estimated by use of computer program, STACKDOSE 2, to result from the initial exposure to the plumes from the stacks. STACKDOSE 2 calculates the tritium concentration every 100 meters from the plant stacks in the predominant wind direction and the corresponding dose from inhalation and skin absorption of tritiated water vapor. It also identifies the location of maximum exposure. (Houser-ORNL)
W74-04177

HEALTH EFFECTS OF ELECTRICITY GENERATION FROM COAL, OIL, AND NUCLEAR FUEL,
Carnegie-Mellon Univ., Pittsburgh, Pa. Graduate School of Industrial Administration.
For primary bibliographic entry see Field 5C.
W74-04184

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE MONTICELLO NUCLEAR GENERATING PLANT, MONTICELLO, MINNESOTA, AUGUST 1970.
EG and G, Inc., Las Vegas, Nev.

Available from NTIS, Springfield, Va., as Rept. No. ARMSl70-6-6, $4.00 per copy, $1.45 microfiche. Report No. ARMS-70-6-6, Sept. 1973. 18 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Surveys, *Radioactivity, *Mapping, Contours, *Remote sensing, *Air pollution, Water pollution sources, Radioisotopes, Nuclear powerplants, Effluents, Nuclear wastes, Food chains, Population, Public health, Mississippi River, Lakes, *Minnesota, Equipment, Instrumentation, Water pollution.
Identifiers: Monticello plant, Boiling water reactor, Gross gamma.

The Aerial Radiological Measuring Systems (ARMS) was used to survey the Monticello Nuclear Generating Plant and surrounding area during August 1970. The survey measured terrestrial background gamma radiation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of a 625 square mile area showing isoexposure contours three feet above the ground. Results indicated the presence of isotopes normally found in the background radiation throughout the United States. (Houser-ORNL)
W74-04185

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING BIG ROCK POINT NUCLEAR PLANT, BIG ROCK POINT, MICHIGAN, 1968,
EG and G, Inc., Las Vegas, Nev.
M. D. Sevart.
Available from NTIS, Springfield, Va., as Report No. ARMS-68-6-3. $4.00 per copy, $1.45 microfiche. Report No. ARMS-68-6-3, Oct 1973. 40 p, 25 fig, 4 tab, 1 append.

Descriptors: *Surveys, *Radioactivity, *Mapping, Contours, *Remote sensing, *Air pollution, Water pollution, Water pollution sources, Radioisotopes, Nuclear powerplants, Effluents, Nuclear wastes, Food chains, Population, Public health, Instrumentation, *Lake Michigan, Equipment.
Identifiers: Big Rock Point Nuclear Plant.

The Aerial Radiological Measuring System (ARMS), operated for U.S. Atomic Energy Commission, was used to perform aerial surveys of several operational and non-operational reactor sites during the summer months of 1968. The data collected on these surveys included aerial photographs of the installations, aerial radiation survey data consisting of exposure rates normalized to 3 feet above the ground plus gamma-ray spectral charts, effluent characterization for operational sites (intensity rates and isotope constituents), and pertinent descriptive information of the installation. Data collected on the Big Rock Point reactor survey are presented. (Houser-ORNL)
W74-04186

UPTAKE AND TRANSLOCATION OF SR BY ZEA MAYS,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 5C.
W74-04187

MANAGEMENT OF RADIOACTIVE AQUEOUS WASTES FROM AEC FUEL-REPROCESSING OPERATIONS,
Division of Production and Materials Management (AEC), Washington, D.C.
W. L. Lenneman.
Available from Supt. of Documents, Gov. Printing Office, Wash., D.C., $1.85 per copy. Nuclear Safety, Vol 14, No 5, p 482-506, Sept-Oct, 1973. 20 fig, 7 tab, 13 ref.

Descriptors: *Nuclear wastes, Nuclear powerplants, Effluents, *Waste disposal, *Waste storage, *Waste treatment, Water pollution, Water pollution sources, Management, Regulation, Monitoring, Columbia River, Nevada, *Acidic water.
Identifiers: Fuel reprocessing, Savannah River(Geo), *Storage tanks.

Since 1944 the Atomic Energy Commission (and its predecessor, the Manhatten District) has been overseeing the management of radioactive wastes from its fuel-reprocessing plants which are contractor operated. Experience during the years has indicated that management of these radioactive wastes requires unrelenting evaluation and appraisal by higher management and management groups. Experience with leaking waste tanks at Hanford, Savannah River, and the National Reactor Testing Station to 1972 is summarized. Important related activities are periodic reviews, frequent analyses, and continuous planning. Guidance is provided for designers of fuel-reprocessing waste-management systems including such features as acid waste storage, double containment, protection against credible forces of nature, facilities for emptying waste-storage tanks, space and accesses for inspection, adequate radiation-monitoring devices connected to a central recording station, and segregation and diversion capability for discharged effluent aqueous streams. (Houser-ORNL)
W74-04188

DETERMINATION OF FALLOUT CS-137 AND NATURALLY OCCURRING GAMMA-RAY EMITTERS IN SEDIMENTS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
J. C. Ritchie, and J. R. McHenry.
International Journal of Applied Radiation and Isotopes, Vol 24, No 10, p 575-578, Oct 1973. 2 fig, 1 tab, 5 ref.

Descriptors: Environment, *Radioactivity, *Radioisotopes, *Cesium, *Strontium, Uranium radioisotopes, Fallout, Water pollution, Deposition(Sediments), Surveys, Assay, Potassium, *Path of pollutants, *Sediments.
Identifiers: Thorium.

With the advent of the nuclear age, a number of radionuclides were introduced into man's natural radiation environment. Two of these radionuclides, cesium-137 and strontium-90, are of particular interest because of their long half lives and biological importance. Research is being conducted on the movement and redistribution of Cs-137 and the naturally occurring gamma-ray emitting radionuclides, thorium, uranium and potassium, in relation to cultural and erosional processes within watersheds. Methods used to determine Cs-137 and the naturally occurring gamma-ray emitters in sediments are described. (Houser-ORNL)
W74-04190

FLUX OF CE-141 THROUGH A EUPHAUSIID CRUSTACEAN,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
For primary bibliographic entry see Field 5C.
W74-04191

ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1970,
Battelle-Pacific Northwest Labs., Richland, Wash. Environmental Evaluations Section.
J. P. Corley.
Available from NTIS, Springfield, Va., as Report No. BNWL-1969. $5.45 per copy, $1.45 microfiche. Report No. BNWL-1669, Sept. 1973. 93 p, 16 fig, 22 tab, 29 ref, 5 append.

Descriptors: *Washington, *Columbia River, *Water pollution, *Water pollution sources, Nuclear powerplants, Effluents, Radioactivity, *Nuclear wastes, Waste disposal, Assay, Measurement, Radioisotopes, Population, Food chains, Public health.
Identifiers: Hanford site(Wash), *Surveillance.

Low-level wastes from Hanford operations, fallout from nuclear weapons testing, naturally-occurring radioelements, and cosmic radiation all contribute to radioactivity in the Hanford environs. The most significant Hanford contributions to off-plant radioactivity and consequent population doses have usually originated with reactor cooling water released to the Colombia River. The surveillance program included sampling and analysis on a routine basis of river water, municipal drinking water, groundwater, air, milk, foodstuffs, fish, shellfish, and gamebirds. Measurements were made of external gamma exposure rates at land stations, in the river, over the river surface, and along the river shoreline. Contamination surveys were made at selected ground plots and along public highways adjacent to the Hanford site. Columbia River water and Richland drinking water were rountinely sampled for chemical and biological analysis, and air quality measurements were made at locations adjacent to the site boundaries. Shutdown in February 1970 of KW Reactor, one of the two remaining single-pass, river water-cooled production reactors, as well as an extended outage of all reactors, greatly reduced the major remaining source of population exposure from Hanford operations. In 1970, average river concentrations of radionuclides were less than 3% of the Concentration Guides, and transport rates of radionuclides in the river were much reduced from 1969. (Houser-ORNL)
W74-04192

INCREASING THE PROCESSING RATE OF PARTICULATE ORGANIC MATTER IN STREAMS,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
K. W. Cummins.
Project Completion Report Institute of Water Research, Michigan State University, January 1974. 110 p. OWRR B-019-MICH (2). 14-31-0001-3597.

Descriptors: Streams, Ecosystems, *Detritus, *Leaves, *Litter, Benthos, *Organic matter, Management, Model studies, Digestion, Carbon dioxide.
Identifiers: Dissolved organic matter, Particulate organic matter, *Carbon dioxide conversion.

Based on a generalized conceptual (and partial mathematics) model of woodland stream ecosystem structure and function, factors effecting the rates of processing of dissolved organic matter (DOM) and particulate organic matter (POM) have been investigated. The interrelation between qualitative and quantitative characteristics of POM and DOM and the functional biological components involved in conversion to CO2 have been intensively studied. Manipulation of POM and DOM inputs and the biological processing functional components show considerable promise as possible management strategies for certain stream systems.
W74-04202

A MODEL OF SALT INTRUSION IN A PARTIALLY MIXED ESTUARY,
New York Inst. of Ocean Resources, N.Y.
J. E. Overland.
Technical Report No. 73-1, September 1973. 72 p, 27 fig, 30 ref. SG 04-3-158-32.

Descriptors: *Hudson River, Model studies, *Estuaries, *Saline water intrusion, *Mixing, *New York, Run-off, *Salinity, *Path of pollu-

tants, Dispersion, Diffusion, Turbulence, Circulation.
Identifiers: Volume transport, Tidal currents, Wind effect, Eddy viscosity, Eddy diffusivity, Halocline.

A model is developed for salt intrusion in partially mixed estuaries that specifies the vertical and horizontal distribution of salinity and volume transport in response to run-off and mixing assumptions. An estimate is made of the dispersion of a pollutant by the calculated velocity distribution in the intrusion region. The salt flux through any cross section is composed of a freshwater component, a dispersive mode resulting from density-induced flow, a dispersive mode of tidal mixing, and a diffusive mode resulting from turbulent mixing. The coupled salt and momentum equations in a vorticity-stream function formulation are solved on a numerical grid that resolves one m in the vertical and six km in the horizontal. The major dynamic simplification is specification of the channel is narrow. Thirteen examples were run to assess the effects of river discharge, wind, and various assumptions of vertical turbulent mixing. The characteristic estuary dimensions and parameters are from the Hudson River. Variable coefficients were also investigated. The coefficients consisted of an adiabatic mixing coefficient with a maximum, KM, that decreased toward the bottom and surface, modified by a separate Richarson number dependence for the eddy viscosity and the eddy diffusivity. The use of stability dependence makes a qualitative improvement over constant coefficient cases by tending to form a stronger halocline near mid-depth. The results suggest that the horizontal distribution of salinity in the Hudson River, under summer run-off conditions, is associated with high values of KM in agreement with the strong tidal currents of the Hudson. The dispersion of a slug load and continuously released pollutant was calculated using the velocities and eddy diffusivities derived by the intrusion model for summer conditions. The circulation spreads the pollutant initially, then the pollutants reciculate seaward in the surface layer and return landward in the bottom layer. (Sinha-OEIS)
W74-04204

A TECHNIQUE FOR SIMULTANEOUS ECHO LOCATION OF FISH AND THERMAL PLUME MAPPING,
Argonne National Lab., Ill.
S. A. Spigarelli, G. P. Romberg, and R. E. Thorne.
Transactions of the American Fisheries Society, Vol 102, No 2, p 462-466, 1973.

Descriptors: *Mapping, *Heated water, Fish, *Distribution patterns, *Lake Michigan, Electric power production, Thermal powerplants, Discharge(Water), *Thermal pollution, Aquatic environment, Environmental effects, Heat flow, Fish behavior, On-site data collections, Temperature, Diurnal distribution, Buoyancy, Mixing.
Identifiers: *Thermal plume mapping, Echo location.

Thermal plume mapping procedures developed at Argonne National Laboratory and echo location procedures developed at the University of Washington(College of Fisheries) were combined to provide a technique for fish distribution studies near thermal discharges. This pilot study was performed on Lake Michigan at the Point Beach Nuclear Power Station on October 28, 1971. Reduction of fish distribution and temperature data from both day and night plume series showed striking diurnal changes in fish orientation. Many schools of fish were observed during the day series, while at night, only individual fish were observed. The depth distribution of individual fish and schools also differed between day and night. During both series fish were more numerous in the upstream side of the plume, and fish were more abundant in the cooler areas of the plume (less than 15C). (Jerome-Vanderbilt)
W74-04229

THERMAL POLLUTION AND ITS CONTROL,
Washington Univ., St. Louis, Mo. Program in Technology and Human Affairs.
C. T. Hill.
Environmental Affairs, Vol 2, No 2, p 406-420, 1972. 2 tab, 49 ref.

Descriptors: *Thermal pollution, *Heated water, *Cooling towers, *Cost analysis, Electric power production, Thermal power plants, Steam, Pollution control, Effluents, Aquatic environment, Environmental effects, Economics, Planning, Electric power demand, Humidity, Air temperature.
Identifiers: *Cooling ponds, Thermal efficiency.

Thermal pollution is waste heat released into the environment as an unavoidable by-product of electric power generation in steam power plants. The magnitude of the thermal pollution problem, some of the concerns raised about it, some of the technologies designed to control it, and some of the beneficial uses of waste heat are discussed. Since thermal power plants have an energy conversion efficiency of only about 40%, anywhere from 45 to 60% of the fuel used is converted into heat which is released to the environment. With the construction of less efficient nuclear power plants the heat release will probably rise in the future. About 50% of all water used in the U.S. is used for cooling, and this percentage is expected to rise as more generating facilities are constructed. The biological effects of heated effluents discharged from these facilities into the aquatic environment are often adverse. Thermal pollution can be controlled at a relatively small extra cost with cooling ponds and cooling towers. Dry cooling towers, although less efficient than other methods of cooling, are seen as the best available solution to thermal pollution. Comparative cost analyses for different cooling systems and types of power production are considered. (Jerome-Vanderbilt)
W74-04234

THE ENVIRONMENTAL AND REGULATORY ASPECTS OF THE BREEDER REACTOR,
Atomic Energy Commission Washington, D.C.
W. O. Doub.
Environmental Affairs, Vol 2, No 1, p 237-249, 1972, 35 ref.

Descriptors: *Nuclear powerplants, Research and development, *Pollutants, *Breeder reactors, Electric power production, Federal government, Research facilities, Projects, Design, *Radioactive wastes, *Thermal pollution, Air pollution, Operations research, Waste disposal, Nuclear energy, Economics, Water pollution control, Regulation.
Identifiers: Liquid metal fast breeder reactors.

Demonstration liquid metal fast breeder reactor plants (LMFBR) are being developed jointly by private industry and government. Such facilities are necessary to provide sufficient amounts of inexpensive nuclear fuel to power the nation's electrical generation facilities. Such facilities can also be virtually pollution-free and their high thermal efficiency should reduce some of the thermal effects problems associated with electric power production. LMFBR support facilities are also being developed. Experience from existing facilities and the light water reactor program is being factored into the design and construction of a 400 MW (thermal) Fast Flux Test Facility (FFTF) which will be the prime irradiation facility for testing many breeder components under actual operating conditions. Although air pollution and thermal pollution may be reduced or eliminated, disposal of waste radioactive material remains something of a problem. A strict safety program against the release of radioactive material and plant breakdown must be developed. Licensing and regulation of these new facilities is discussed briefly. (Jerome-Vanderbilt)
W74-04238

THE DESIGN OF THE MONITORING SYSTEM FOR THE THERMAL EFFECT STUDY OF THE SURRY NUCLEAR POWER PLANT ON THE JAMES RIVER,
Virginia Inst. of Marine Science, Gloucester Point.
R. L. Bolus, S. N. Chia, and C. S. Fang.
Special Report in Applied Marine Science and Ocean Engineering No 16, October 1971. 71 p, 23 fig, 9 tab, 5 append, 12 ref. AEC-AT-(40-1)-4067.

Descriptors: *Thermal pollution, *Estuaries, *Nuclear powerplants, *Instrumentation, *Monitoring, Electric power production, Water cooling, Flow, Salinity, Temperature, Heat transfer, Discharge(Water), Effluents, *Virginia, Environmental effects, Computers, Data Collection, Analysis, Design.
Identifiers: *James River(Va.).

In a study of the Hog Island region of the James River estuary (which will be affected by the thermal discharges of the Surry nuclear power plant to be located there) the temperature variations, salinity, flow velocity and other factors are investigated. The instrumentation consisted of a multi-sensor unit located on a 30 foot boat, a multi-sensor system located on towers in the river and an infra-red sensor scanning device located in an airplane. Detailed data and error analyses are given for the sensors. Raw voltage data are shown in the form of computer printouts, which must be processed to obtain temperature, salinity, velocity and other specific information. This part of the study supplies the pre-operational background data which is correlated to the model study data. The study program will continue at Surry Point until there are two operational nuclear power plants in the area. The work will be useful in verifying and improving present scientific techniques of predicting changes in estuaries due to similar industrial developments. (Jerome-Vanderbilt)
W74-04246

CORRELATION OF ORGANIC CARBON WITH DIFFERENT KINDS OF OXIDIZABILITY IN THE OPEN WATERS OF LAKE BAIKAL,
Limnologicheskii Institut, Irkutsk (USSR).
For primary bibliographic entry see Field 2H.
W74-04256

COAGULATION IN ESTUARIES,
North Carolina Univ. Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. K. Edzwald, J. B. Upchurch, and C. R. O'Melia.
Environmental Science and Technology, Vol 8, No 1, p 58-63, January 1974. 6 fig, 5 tab, 21 ref. NSF Grant GF-103.

Descriptors: *Deposition(Sediments), *Colloids, *Coagulation, *Estuaries, *Clay minerals, Clays, Salinity, Hydrogen ion concentration, Water chemistry, Sedimentation, *North Carolina.
Identifiers: *Pamlico estuary(N.C.).

The stability of clay suspensions as a function of ionic strength was determined from observations of coagulation rates. The stability value depends on the type of clay mineral and on chemical solution parameters such as salinity and pH. Clays can be destabilized in estuaries by compression of the electrical double layer. Measurements of the composition and stability of sediments collected along the 35-mile length of the Pamlico Estuary indicated that the sediments in the upper end of the estuary were less stable than those collected in the downstream brackish areas. Kaolinite, a relatively unstable clay, was predominant in the upstream sediments while illite, a more stable clay, accumulated in the sediments near the mouth of the estuary. These observations are consistent with the view that sediment deposition in the estuary is influenced by coagulation. The transport of colloidal suspensions from freshwaters into estuaries is accompanied by a reduction in particle stability resulting in the coagulation and deposition of

suspended matter can have signigicant effects on water quality. Cohesive sediments such as clays and silts are responsible for the shoaling of estuarine channels, the formation of deltas, and the persistence of turbidity currents in estuaries. A substantial portion of the BOD in the effluent from conventional secondary waste treatment plants is colloidal. These organic colloids, like the inorganic clay minerals, may also coagulate in estuaries. (Knapp-USGS)
W74-04257

WATER QUALITY CYCLE--REFLECTION OF ACTIVITIES OF NATURE AND MAN,
California State Dept. of Water Resources, Los Agneles. Southern District.
A. A. Hassan.
Ground Water, Vol 12, No 1, p 16-21, January-February 1974. 5 fig, 1 tab, 2 ref.

Descriptors: Water quality, *Path of pollutants, *Hydrologic cycle, Water chemistry, *Water pollution sources, Groundwater, Surface waters, Precipitation(Atmospheric).
Identifiers: *Water quality cycle.

As water travels along the path of the hydrologic cycle, it changes from pure salt-free water suspended in the troposphere to ocean brines. Along the way, it progressively picks up salts in the atmosphere, on the earth's surface, through the soil medium and the unsaturated zone, and the saturated zone. Percolation of waste discharges and recycling of groundwater through man's use add other complex factors. The process is a water quality cycle. Although water may be abundant, it may not all be fit for use. Understanding of the intricate processes that cause the change in the chemical composition of water is necessary to implement sound water quality management. (Knapp-USGS)
W74-04263

THE INFLUENCE OF SUSPENDED PARTICLES ON THE PRECIPITATION OF IRON IN NATURAL WATERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
S. R. Aston, and R. Chester.
Estuarine and Coastal Marine Science, Vol 1, No 3, P 225-231. July 1973. 2 fig, 1 tab, 22 ref.

Descriptors: *Estuaries, *Suspended load, *Iron, *Hydrolysis, Colloids, Water chemistry, *Path of pollutants, Salinity, Chemical precipitation, Hydrogen ion concentration, Oxidation-reduction potential.

Radiotracer experiments determined the effects of suspended sediment particles and changes in salinity on the precipitation of iron in seawater. Both increasing salinity and the presence of supended particles increase the rate and extent of iron precipitation in seawater. Electrophoretic measurements show that the surface charge of sediment particles becomes less negative during the hydrolysis and precipitation of iron. This is a result of the sediment particles acting as negative nuclei for the aggregation of iron hydrolysis products. Estuaries are transitional environments where river and seawaters, which have very different physiochemical properties, have their initial contact and, therefore, undergo their initial interactions. One of these interactions involves the precipitation and flocculation of iron which has been kept in 'solution' or as stabilized colloid under the physiochemical conditions operative in river water. After their formation in the estuarine environment the iron particles can be important in the control of oceanic trace element budgets. The hydrous oxides of iron are very efficient scavengers of trace elements. Some of the iron particles become involved in biological processes. Others may sink to the bottom and be incorporated into estuarine and deltaic sediments. The small particles of hydrous iron oxides formed in estuarine environments may play an important role in transporting elements such as cobalt and nickel to deep-sea areas where they are enriched in the underlying sediments. Another role in which the hydrous oxides or iron may be important in estuaries is that by forming coatings around the sediment particles, which have acted as nuclei for aggregation, they can prevent trace element desorption from ion exchange sites in addition to acquiring fresh trace elements by adsorption from solution. (Knapp-USGS)
W74-04272

SOME PHYSICAL AND CHEMICAL PROPERTIES OF THE GULF OF CORINTH,
Washington Univ. Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W74-04273

SPECTROPHOTOMETRIC DETERMINATION OF HEXACHLOROBUTADIENE (HCBD) IN SOIL AND WATER, (IN RUSSIAN),
Akademiya Nauk Moldavskoi SSR, Kishinev.
Yu. S. Lyalikov, and L. M. Dranovskaya.
Gig Sanit. Vol 37, No 5, p 57-59. 1972. Illus.
Identifiers: *Butadiene(Hexachloro-), *Spectrophotometry, Pollutant identification, Path of pollutants, Soil analysis.

Spectrophotometric determinations confirmed that hexachlorobutadiene (HCBD) migrates from the upper layers of soil to deeper layers and can persist there unaltered for a long time. The spectrophotographic method recommended can be used to determine HCBD in soil and water. It is sensitive (2 micrograms in a sample) and specific.--Copyright 1973, Biological Abstracts, Inc.
W74-04293

5C. Effects Of Pollution

THERMAL TOLERANCES OF INTERIOR ALASKAN ARCTIC GRAYLING (THYMALLUS ARCTICUS),
Alaska Univ., College. Inst. of Water Resources.
J. D. LaPerriere, and R. F. Carlson.
Availability from NTIS as PB-227 239 $3.25 in paper copy, $1.45 in microfiche. Report No IWR-46, December, 1973. 36 p, 2 fig, 10 tab, 13 ref. OWRR A-041-ALAS(3).

Descriptors: *Bioassay, Fish, *Thermal pollution, *Alaska, Subarctic, Heat resistance, Water pollution effects, Water temperature.
Identifiers: *Arctic grayling, Thymallus arcticus, *Thermal tolerance, Chena River(Alas).

Arctic grayling, Thymallus arcticus, captured from the Chena River in Interior Alaska or artificially propogated from the sex products of fish from this population were tested for tolerance to elevated water temperatures. Most tests were conducted in recirculating temperature-controlled tanks with a few conducted as standard static bioassays. Median tolerance limit ranges were delineated for sac fry, young-of-the-year, fish larger than 10 cm, and fish larger than 20 cm. There is some evidence that the least sensitive life cycle stage is the young-of-the-year which had a median tolerance limit above 24.5C after acclimatization of 8.5C plus or minus 1C. Equipment limitations did not allow acclimatization of all fish at the same temperature, however. Therefore, some changes in tolerance due to life cycle changes were somewhat masked by the effect of different acclimatization temperatures.
W74-03759

SOME EFFECTS OF WASTES ON NATURAL WATERS,
Vanderbilt Univ., Nashville, Tenn.
For primary bibliographic entry see Field 5B.
W74-03793

FISH BEHAVIOR RELATED TO THERMAL POLLUTION,
Colorado State Univ., Fort Collins. Dept. of Fishery and Wildlife Biology.
H. K. Hagen.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 11, p 11-1--11-23, 1973. 7 fig, 1 tab, 20 ref.

Descriptors: *Thermal pollution, Fish, *Fish behavior, Migration, Fish physiology, Fish reproduction, Pathology, Stratified flow, *Thermal stratification, *Water pollution effects.

Fish behavior is discussed as related to thermal pollution. Because coldblooded animals cannot change their body temperature by losing water vapor in expired air or in sweat as a warmblooded animal can, they are severely handicapped in an environment that might be subjected to rapid or extreme thermal fluctuations. The growth of fish is also closely related to temperature and has much narrower limits than the lethal boundaries. In most species the food consumption and growth rate will increase in a sigmoid pattern in response to temperature increases, but in many instances after a leveling is reached, any increase in temperature will cause a decrease in feeding and growth, or both, with a resulting, often rapid, decrease in body weight and stamina. Any temperature change will have an ultimate effect on fish. Of major concern in thermally polluted waters is the possible blockage of migrations by either anadromous or catadromous fishes. Fish and many of the invertebrates of the Firehole River in Yellowstone Park seem aware of the stability of heated water layers and maintain themselves only inches from scalding temperatures. Although layering is generally a function of volume and surface area, in several instances very resistant stratification occurs in no more than twelve inches of depth. In smaller streams such as Witch Creek, where some thermal discharges approached 20% of the streamflow, the boundary zones were distinct enough so that the fish could pass freely up and down the stream. (Knapp-USGS)
W74-03795

STUDIES ON UPTAKE AND LOSS OF METHYLMERCURY-203 BY BLUEGILLS (LEPOMIS MACROCHIRUS RAF.),
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
W. D. Burrows, and P. A. Krenkel.
Environmental Science and Technology, Vol 7, No 13, p 1127-1130, December 1973. 3 fig, 2 tab, 21 ref.

Descriptors: *Bioassay, *Sunfishes, Absorption, *Mercury, Heavy metals.
Identifiers: *Bioaccumulation, *Biotransformation, *Methylmercury, Excretion, Elimination, Biological samples, Kidneys, Liver.

The uptake of methylmercury-203 directly from water by bluegills was found to be nearly constant after five days at about 20 percent per gram of fish per liter of water. Transferred to mercury-free water at 24C, bluegills exhibited a rapid loss of about 40 percent of the mercury, followed by a slow loss with a half-time of about five months. Mercury levels in the liver and kidneys were two to seven times higher than whole fish levels, but there was no discernible trend in this ratio with time. The proportion of mercury present as methylmercury in the whole fish remained at 73 plus or minus 10 percent throughout the course of the experiment. The proportion of methylmercury in the liver and kidneys, however, fell rapidly in the first few weeks after exposure, ultimately leveling off at about 10 percent. This suggests that biochemical demethylation is taking place in these organs. (Little-Battelle)

W74-03839

BIOLOGICAL EFFECTS OF OCEAN DISPOSAL OF SOLID WASTE,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
S. D. Pratt, S. B. Saila, A. G. Gaines, Jr., and J. F. Krout.
Marine Technical Report Series Number 9, 1973. 53 p, 26 fig, 19 tab, 176 ref.

Descriptors: Model studies, *Water pollution effects, *Degradation(Decomposition), *Waste disposal, Oceans, *Solid wastes, Laboratory tests, *Oxygen demand, Gases, Marine fish, *Benthic fauna, Connate water, Sea water, Bioassay, Toxicity, Organic matter, Water quality, Nitrogen, Hydrogen sulfide, Oxygen, Methane, Fouling, Carbon dioxide, Foods, Heavy metals, Water analysis, Dissolved solids, Shrimp, Crabs, Clams, Mussels, Plastics.
Identifiers: Fate of pollutants, Gas production, Capitella capitata, Nereis succinea, Barnacles, Macroinvertebrates, Paper, Glass, Characterization, Dissolved organic carbon, Dissolved organic nitrogen, Mobilization.

The possible biological effects of disposal of compressed solid waste was studied by conducting literature research and laboratory tests with scaled down waste samples. Tests were conducted in tanks (16 ft X 1 ft X 1 ft) floored with test waste consisting of paper, food, tin cans, aluminum, plastic, and glass. A control tank was floored with sand. Oxygen uptake was studied in a 4 ft X 4 in. X 4 in. tank, and waste degradation was monitored in 20-gal tanks in a temperature controlled bath. A variety of dissolved substances were monitored in water overlying the waste and in interstitial water. Interstitial water was monitored in tanks containing high organic waste in salt water and in fresh water, high organic waste in salt water poisoned with mercuric chloride, and low organic waste in salt water. Analysis of gas production from the model systems and from slurries suspended in seawater showed that H2, 02, N2, CH4, CO2, and H2S were produced. Rate of oxygen uptake in the test tank was several times higher than that of the control tank, but never exceeded 100 ml/sq m/hr. Slides in the waste tank were fouled by filaments of sulfide bacteria which also contained nematodes, oligochaetes, and harpacticoid copepods. Only two large infaunal species colonized the waste deposits: Capitella capitata and Nereis succinea. Marine fish and shrimp died in 72-hr bioassays in which they were exposed to water flowing over the waste. No mortality occurred with barnacles, hermit crabs, rock crabs, mussels, surf clams, or oceanguahogs. The major toxicant was H2S. It is concluded that degradation of solid waste will be slow in the ocean. However, more research is needed before the long-term effects and consequent safety of ocean disposal can be adequately assessed. (Little-Battelle)
W74-03840

THE EFFECT OF HYPOCHLORITE ON THE GERMINATION OF SPORES OF CLOSTRIDIUM BIFERMENTANS,
Agricultural Research Council, Norwich (England). Food Research Inst.
L. R. Wyatt, and W. M. Waites.
Journal of General Microbiology, Vol 78, No 2, p 383-385, October 1973. 1 tab, 10 ref.

Descriptors: *Clostridium, *Germination, *Spores, *Cultures, *Disinfection, Chlorine, Microscopy, Spectrophotometry, Resistance.
Identifiers: *Hypochlorites, Disinfectants, Survival.

To investigate the effect of hypochlorite on germination of spores, a suspension of Clostridium bifermentans containing about 3.5 mg dry wt spores was centrifuged at 1500 g for 10 min and the spore pellet resuspended in 5 ml of a solution of 100 micrograms sodium hypochlorite/ml containing 50 micrograms free chlorine. The suspension was incubated for 10 min at 0C and centrifuged at 35000 g for 3 min, and the spores were washed once in 10 ml glass-distilled water and stored at 4C and then resuspended in 15 ml glass-distilled water and stored at 0C until required for measurement of germination rates. Germination rates were measured at 37C either spectrophotometrically or microscopically. Incubation with a solution of sodium hypochlorite increased the germination rate of spores of mutants of Clostridium bifermentans by up to 3500-fold and in some cases to about that of the wild-type. Hypochlorite treatment resulted in about a 60 percent decrease in viable spores. The efficiency of chlorinating agents as disinfectants may be due, in part, to stimulation of spore germination followed by inactivation of the germinated spore. (Mortland-Battelle)
W74-03841

OCCUPATIONALLY RELATED HEALTH HAZARDS IN WASTEWATER TREATMENT SYSTEMS,
Ottawa Univ. (Ontario).
T. Viraraghavan.
Water Pollution Control Federation Highlights, Vol 10, No 11, p D2-D3, November 1973. 1 tab, 10 ref.

Descriptors: *Municipal wastes, *Waste water treatment, *Pathogenic bacteria, *Human diseases, Public health, Hazards, *Canada, Nematodes.
Identifiers: *Occupational health, Hepatitis, Typhoid, Paratyphoid, Dysentery, Tuberculosis, Poliomyelitis, Leptospirosis.

A study was undertaken by Ontario municipalities to evaluate the health hazards to the workers in their wastewater systems. Twenty-five municipalities were addressed for specific information on the number of workers in their collection and treatment systems who, during the period of 1970 to October 1972, and as a result of their occupations, contracted any of the following diseases: typhoid/paratyphoid fevers, bacillary dysentery, amoebic dysentery, roundworm or other worm infections, tuberculosis, poliomyelitis, infections hepatitis, and leptospirosis (Weil's disease). The cities were also requested to state whether any of those diseases contracted resulted from accidental falls into the works or from prolonged exposure only. Three municipalities reported four occupational cases of infectious hepatitis in their workers. No municipality reported any of the other seven diseases as having been contracted resulting from the occupations of the wastewater workers. This preliminary study indicated that health hazards may exist among the workers in wastewater treatment works, although the actual incidence of disease may not be high. The few cases of infectious hepatitis reported could also be chance occurrences. There is need for (1) further detailed studies in which the health of a worker before he joins the works is fully ascertained and documented and (2) periodical examination for many of these diseases. (Mortland-Battelle)
W74-03853

IN-PLANT BIOLOGICAL MONITORING,
For primary bibliographic entry see Field 5A.
W74-03855

EFFECT OF PH ON TOXICITY OF COPPER TO SCYTALIDIUM SP., A COPPER-TOLERANT FUNGUS, AND SOME OTHER FUNGI,
Rutgers - The State Univ., New Brunswick, N.J. Coll. of Agriculture and Environmental Science.
R. L. Starkey.
Journal of General Microbiology, Vol 78, No 2, p 217-225, October 1973. 5 tab, 32 ref.

Descriptors: *Copper, *Toxicity, *Hydrogen ion concentration, *Fungi, Iron, Chromium, Cobalt, Chlorides, Cultures, Nitrogen, Salts, Heavy metals, Water pollution effects.
Identifiers: *Scytalidium, *Oxine, *EDTA, Chelating agents, Culture media.

The effect of the chelating agents, oxine (8-hydroxy-quinoline) and EDTA (ethylenediaminetetra-acetic acid) on toxicity of copper to Scytalidium sp., and the influence of salts of iron, cobalt and chromium on development of the fungus, have been determined. Scytalidium sp. grew in acidic media (pH 2.0 to 0.3) saturated with copper sulphate (approx. 1 M) but was sensitive to low concentrations of copper (0.0004 M) near neutrality. Eleven other fungi (Aspergillus, Penicillium, Trichoderma, Fusarium, Monilinia, Stemphylium, and Rhizopus) differed in that they tolerated relatively high concentrations of copper near neutrality; nine tolerated high concentrations from pH 3.0 to 7.0, and six tolerated 0.004 M-copper sulphate at pH 2.0 to 7.0. Oxine was more toxic to Scytalidium sp. at neutrality than it was at an acid pH and in the presence of relatively large amounts of copper. EDTA had no appreciable effect on toxicity of copper. The fungus was relatively tolerant to chlorides of iron, cobalt and chromium at both neutral and acid pH. (Mortland-Battelle)
W74-03857

ALGAL GROWTH PREDICTION USING GROWTH KINETIC CONSTANTS,
National Inst. for Water Research, Pretoria (South Africa).
D. F. Toerien, and C. H. Huang.
Water Research, Vol 7, No 11, p 1673-1681, November 1973. 2 fig, 4 tab, 15 ref.

Descriptors: *Growth rates, *Kinetics, *Phosphorus, *Bioassay, *Cultures, Forecasting, Time, Eutrophication, Biomass, Nutrients, Suspended solids, Chlorophyta, Sodium, Magnesium, Sulfur, Calcium, Carbon, Iron, Boron, Zinc, Cobalt, Copper, Molybdenum, Estimating, Limiting factors.
Identifiers: *Selenastrum capricornutum, Batch cultures.

The growth kinetics under conditions of phosphorus limitation of Selenastrum capicornutum Printz, a green alga specified for use in algal bioassays, were used to predict growth in batch cultures for varied specific conditions of time and phosphorus concentration. These predictions compared very well with actual batch culture growth studies. The predicted maximum cell concentration for two different levels of phosphorus lay within values obtained in different laboratories. The predicted maximum specific growth rates were either close to or just above actual laboratory data. The determination of growth kinetics thus allows accurate prediction of the growth of planktonic algae, a benefit in either algal bioassays or the solution of practical eutrophication problems. The growth kinetic constants of specific algae important in eutrophication problems need to be determined in order to utilize potentialities of prediction in the rational solution of these problems. (Mortland-Battelle)
W74-03871

EFFECT OF PHENOL ON OXYGEN UPTAKE RATE OF A LABORATORY POPULATION OF CHIRONOMUS ATTENUATUS (WALK.),
Mid-America Nazarene Coll., Olathe, Kans.
S. L. Cole, and J. Wilhm.
Water Research, Vol 7, No 11, p 1691-1700, November 1973. 6 fig, 2 tab, 27 ref.

Descriptors: *Diptera, *Oxygen, Absorption, *Phenols, *Toxicity, *Bioassay, Respiration, Larvae, Water temperature, Hydrogen ion concentration, Dissolved oxygen, Weight, Regression analy-

s, Water quality, Oxygen demand, Equations, Water pollution effects, Aquatic insects, Midges. Identifiers: *Chironomus attenuatus, Macroinvertebrates, Oxygen consumption.

, laboratory population of fourth-instar larval orms of Chironomus attenuatus Walker received continuous life-long exposure of 0, 2.8, 11.2, 5.3, and 22.4 ppm phenol. Measurements were ken of water temperature, pH, and dissolved oxgen concentration. Larvae exposed to the different phenol concentrations were analyzed for ven-dry weight and ash-free weight. The oxygen ptake was determined. The regression of oxygen ptake (Y), adjusted for phenol level, pH, and oxgen concentration, on ash-free weight (X) was log equals 0.173 minus 0.478 log X. The regression f adjusted oxygen uptake (Y) on phenol concenration (X) was Y minus 1.632 plus 0.299 log X. alories lost through respiration (Y) were related phenol level (X) by the equation, Y equals 0.0021) plus (0.000386) log X. The ash-free weight er individual (Y) decreased with increasing henol concentration (X) as explained by the equaon, Y equals 0.114 log X. (Mortland-Battelle) W74-03872

HRONIC TOXICITY OF A COPPER, CADMIM AND ZINC MIXTURE TO THE FATHEAD INNOW (PIMEPHALES PROMELAS AFINESQUE),
National Water Quality Lab., Duluth, Minn.
. G. Eaton.
Water Research, Vol 7, No 11, p 1723-1736, November 1973. 1 fig, 7 tab, 19 ref.

Descriptors: *Copper, *Cadmium, *Zinc, Toxicity, *Bioassay, Lethal limit, Spectrophotometry, Water temperature, Growth tages, Spawning, Larvae, Minnows, Heavy netals, Mortality, Water analysis.
dentifiers: *Fathead minnow, Embryos, Atomic bsorption spectrophotometry, Synergistic effects, Threshold toxicity, Continuous flow echnique.

Fathead minnows were exposed to a series of concentrations of a copper, cadmium and zinc mixture during a 12.5 month chronic test in water of 200 mg/l total hardness. The metal concentrations in he mixture were selected on the basis of results btained during previous chronic exposures to ach of the metals individually in the same water. Strict summation of the chronic toxicities of the netals was not indicated when they were tested in ombination. Toxic effects of the mixture atributable to copper appeared to be increased, but hat attributable to cadmium was reduced. The effects thought to be due to zinc were similar in legree to those observed in the single chronic exposure. Summation of effects resulting from a nixture containing about the same proportions of copper, cadmium and zinc occurred at a much igher, acutely lethal concentration. A lethal hreshold was attained in the mixture when each netal was present at a concentration of 0.4 or less f its individual lethal threshold. (Mortland-Battelle) W74-03873

THERMOPHILIC FUNGI IN A MUNICIPAL WASTE COMPOST SYSTEM,
Florida Univ., Gainesville. Dept. of Botany.
For primary bibliographic entry see Field 5A.
W74-03875

OIL-INDUCED MORTALITIES IN JUVENILE COHO AND SOCKEYE SALMON,
Alaska Univ., College. Dept. of Biological Sciences.
J. E. Morrow.
Journal of Marine Research, Vol 31, No 3, p 135-143, September 15, 1973. 6 tab, 15 ref.

Descriptors: *Sockeye salmon, *Toxicity, *Lethal limit, *Water temperature, *Fish behavior, *Bioassay, Sea water, Mortality, Stress, Arctic, Oil, Aging(Physical), Juvenile fish.
Identifiers: *Coho salmon, *Crude oil.

A laboratory study was undertaken to determine the effects of crude oil in concentrations that might occur from an oil spill on sockeye and coho salmon. Specimens aged 9 to 13 months that had been raised from eggs were first acclimated to artificial seawater of 3 percent salinity. Crude oil was introduced in concentrations from 500 to 3500 ppm and the water temperature was set at 3, 8, or 13C. Stress behavior under the influence of oil was also investigated. Mortality rates of up to 100 percent were produced in 96 hrs. The majority of the 96-hour experimental mortality rates were significantly higher than the mortality rates of control animals. The mortality rates were directly related to the concentration of oil, but appeared to be inversely related to water temperature. Mortality apparently was caused by some component of crude oil that is soluble in water and is also volatile and/or easily oxidized. It was found that crude oil loses its toxicity to salmon after exposure to air, probably through the loss of volatile toxic components. Hence, conclusions based on bioassay work with oil of unknown history may be less valuable than those derived from studies wherein the handling history of the oil is known. (Mortland-Battelle)
W74-03876

MIXED CULTURE BIOOXIDATION OF PHENOL. I. DETERMINATION OF KINETIC PARAMETERS,
State Univ. of New York, Buffalo. Dept. of Chemical Engineering.
U. Pawlowsky, and J. A. Howell.
Biotechnology and Bioengineering, Vol 15, No 5, p 889-896, September 1973. 4 fig, 3 tab, 21 ref.

Descriptors: *Phenols, *Oxidation, *Cultures, *Kinetics, *Growth rates, Activated sludge, Protozoa, Statistical methods, Rotifers, Sphaerotilus, Algae, Fungi, Metabolism, Soil, Sewage treatment, Chemical oxygen demand, Spectrophotometry, Microbial degradation, Sewage bacteria.
Identifiers: *Biooxidation, Ultraviolet spectrophotometry, Substrate utilization, Mixed cultures.

A mixed culture derived from soil and activated sludge organisms was used to degrade phenol which was inhibitory to microorganisms at higher concentrations. The purpose of the experiments was to determine the kinetic parameters governing growth of the organisms by measuring growth rates in batch culture. To maintain a constant inoculum for the experiments, inoculum was taken from a continuously operating continuous culture. Two populations were studied corresponding to two separate residence times in the continuous culture apparatus. One contained predominantly filamentous organisms, the other nonfilamentous. Five kinetic models were applied to the data and the best kinetic parameters for each model were determined by nonlinear least squares techniques. The models were then evaluated for best relative fit to the data. No significant differences were found between the models on the basis of fit and so a choice was made on the grounds of simplicity. A model proposed by Haldane was chosen as the best. No function however gave a satisfactory fit at the highest growth rates obtained. This experimental maximum in the plot of growth rate against substrate concentration was very sharp. (See also W74-03880 and W74-03881) (Mortland-Battelle)
W74-03879

MIXED CULTURE BIOOXIDATION OF PHENOL. II. STEADY STATE EXPERIMENTS IN CONTINUOUS CULTURE,
State Univ. of New York, Buffalo. Dept. of Chemical Engineering.
U. Pawlowsky, and J. A. Howell.
Biotechnology and Bioengineering, Vol 15, No 5, p 897-903, September 1973. 5 fig, 15 ref.

Descriptors: *Phenols, *Model studies, Cultures, Kinetics, Biomass, Sewage bacteria, Oxidation, Spectrophotometry, Gravimetric analysis, Statistical methods, Sewage treatment, Mathematical models.
Identifiers: *Biooxidation, *Continuous cultures, *Wall growth, Steady State experiments, Biological reactors, Mixed cultures, Substrate utilization.

A problem in steady-state analysis of the continuous stirred tank biological reactor is the failure to predict the effect of high dilution rate near the washout condition. One cause could be apparatus effects, the most likely of which is bacterial growth on the walls of the reactor. This study attempted to test the applicability of a wall-growth factor in a model developed for the case of substrate inhibited kinetics. Continuous culture experiments, using a mixed population of organisms on phenol, were performed in continuous stirred tank biological reactors. Steady state phenol concentrations were measured by ultraviolet spectrophotometry for a range of inlet concentrations from 100 to 800 mg at various dilution rates. These results were compared with those predicted from the model. The effect of growth on the walls of the vessel was considerable and increased by a factor of up to 3X the dilution rate at which 90 percent conversion of phenol could be obtained. (See also W74-03879) (Mortland-Battelle)
W74-03880

MIXED CULTURE BIOOXIDATION OF PHENOL. III. EXISTENCE OF MULTIPLE STEADY STATES IN CONTINUOUS CULTURE WITH WALL GROWTH,
State Univ. of New York, Buffalo. Dept. of Chemical Engineering.
U. Pawlowsky, J. A. Howell, and C. T. Chi.
Biotechnology and Bioengineering, Vol 15, No 5, p 905-916, September 1973. 7 fig, 3 tab, 6 ref.

Descriptors: *Phenols, *Model studies, *Sewage bacteria, Cultures, Biomass, Oxidation, Mathematical models.
Identifiers: *Biooxidation, *Continuous cultures, *Wall growth, Steady State experiments, Biological reactors, Shock loading, Mixed cultures, Substrate utilization.

It is shown that two steady states exist in certain regions of operation of a 2-liter continuous stirred tank biological reactor. Transition was made from one steady state to another by applying shock loads of either phenol substrate which is inhibitory to the culture at high concentrations or by adding large additional amounts of concentrated organisms. The existence of the multiple steady states is ascribed to the existence of wall growth, and their position is determined by the amount of wall growth. Transient behavior of the system did not follow the predictions of the simple wall growth model but the culture appeared to undergo a lag period immediately after applying the shock load to the system. It is concluded that the stability of a continuous culture utilizing an inhibitory substrate is improved by increasing the degree of wall growth and decreasing the substrate feed concentration. It is also concluded that small scale experiments can usually not be interpreted correctly unless the effect of wall growth is taken into account. (See also W74-03879) (Mortland-Battelle)
W74-03881

PHENOTYPIC VARIABILITY OF THE ENVELOPE PROTEINS OF KLEBSIELLA AEROGENES,
Microbiological Research Establishment, Salisbury (England).
A. Robinson, and D. W. Tempest.
Journal of General Microbiology, Vol 78, No 2, p 361-370, October 1973. 4 fig, 2 tab, 24 ref.

Descriptors: *Proteins, *Isolation, Cultures, Sulfur, Nutrients, Growth rates, Separation techniques, Electrophoresis, Carbohydrates, Potassium, Magnesium, Phosphates, Ammonia, Sulfates, Aerobic bacteria, Centrifugation, Limiting factors, Enteric bacteria, Cytological studies.
Identifiers: *Klebsiella aerogenes, Glucose, Chemostat, Sample preparation, Gel electrophoresis, Culture media, Continuous cultures, Cell envelopes.

The envelope proteins of Klebsiella aerogenes (syn. Aerobacter aerogenes) grown in glucose-, sulphate-, phosphate-, ammonia-, potassium- and magnesium-limited environments, in chemostats, have been isolated, and compared by SDS-polyacrylamide gel electrophoresis; marked differences were evident. The envelopes from glucose- and sulphate-limited organisms were examined further: protein content was growth-rate dependent, but sulphate-limited envelopes always contained less protein than glucose-limited envelopes, and this protein had a lower sulphur content. The sulphate-limited envelopes contained one major protein component with a molecular weight of 30,000 daltons whereas the glucose-limited envelopes contained three main protein components (molecular weights of 46000, 38000 and 28500 daltons). Selective extraction of membrane proteins with Triton X-100 indicated that both wall and membrane proteins altered in response to changes in the growth environment. Similarly, the soluble proteins of the organisms varied, but the ribosomal proteins remained almost constant. (Mortland-Battelle)
W74-03882

NORTH CAROLINA MARINE ALGAE. II. NEW RECORDS AND OBSERVATIONS OF THE BENTHIC OFFSHORE FLORA,
Duke Univ., Durham, N.C. Dept. of Botany.
For primary bibliographic entry see Field 5A.
W74-03885

THE CHARACTERIZATION AND INFLUENCE OF DOMESTIC DRAIN EFFLUENTS ON THE RED CEDAR RIVER,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5B.
W74-03895

MERCURY: UPTAKE BY THE GOLDFISH, CARASSIUS AURATUS, FROM LOW CONCENTRATIONS IN WATER AND ITS TISSUE DISTRIBUTION,
New Mexico Inst. of Mining and Technology, Socorro. Dept. of Chemistry.
D. H. Baker, III.
Available from the National Technical Information Service as PB-227 462; $5.25 in paper copy, $1.45 in microfiche. M.S. Thesis, 1973. 37 p, 6 fig, 5 tab, 19 ref, 2 append. OWRR A-038-NMEX(1).

Descriptors: *Water quality, *Mercury, Fish, *Heavy metals, Water pollution effects, Water chemistry, *Water pollution sources, Path of pollutants.
Identifiers: *Goldfish, Aquatic systems, Methyl mercury, Dimethyl mercury, Mineral content.

The uptake and distribution of mercury in selected tissue of goldfish (Carassius auratus) from low-level mercury contaminated water were determined. The mercury concentration was 5 ppb and tissue analyzed were liver, kidney and muscle. Goldfish accumulate mercury from low-level mercury concentration in water. The whole body mercury increase in the fish was from 0.07 to 1.3 ppm. The selected tissues (kidney, liver and muscle) showed accumulations from 3 to 14 ppm, 1 to 10 ppm and 0.06 to 1.2 ppm respectively. The mercury in the water demonstrated a cyclic nature from the inorganic form to organic form and back. Mercury was also rapidly lost from the aquatic system and the water had to be continually monitored to determine the amount of mercury to be added to maintain the 5 ppb level. (Creel-New Mexico)
W74-03898

A STUDY OF MERCURIALS IN THE ELEPHANT BUTTE RESERVOIR ECOSYSTEM,
New Mexico Univ., Albuquerque. Dept. of Biology.
J. D. Garcia.
Available from the National Technical Information Service as PB-227 458; $9.75 in paper copy, $1.45 in microfiche. Ph. D. Dissertation, 1973. 128 p, 26 tab, 3 fig, 83 ref. OWRR A-040-NMEX(1).

Descriptors: *New Mexico, *Ecosystems, *Trophic level, Fish, *Mercury, *Aquatic animals, Turtles, Crayfish, Zooplankton, Food chains, Fish diets, *Freshwater fish, Bass, Channel catfish, Lake trout, Carp, Suckers, Walleye, Mussels, Organic matter, Water pollution sources, Water pollution effects.
Identifiers: *Mercurials, Bioamplification, Nonvascular plants, Organic debris, Percites.

Analyses of samples for mercury from Elephant Butte Lake collections were made by a flameless atomic absorption procedure. Analyses revealed mean ppb mercury concentrations of 0.027 in water, 57 in bottom sediments, 109 in phytoplankton, 277 in attached algae and bryophytes, 95 in plant debris, 69 in zooplankton, 90 in crayfish muscle, 26 in visceral mass of mussels, 97 in muscle of nonpredaceous fish, 125 in muscle of small predaceous fish, 253 in muscle of large predaceous fish, and 266 in muscle of two turtle species. Tissues grouped by relative levels for the sixteen fish species show consistently lower levels in bone, skin, gills, and eyes; intermediate levels in stomach, intestine, heart, and brain; and higher levels in spleen, muscle, kidney, and liver. General bioamplification at higher trophic levels appears to be diet related, but the relationship does not hold for lower trophic levels. Mercury levels in the water indicate a decreasing gradient from inlet to dam, while sediments display an increasing gradient from inlet to dam. Arguments are given which attempt to account for concentration in some higher trophic level species. Evidence suggests that mercury levels are related to seasonal conditions. A bioamplification scheme and concentration factors are presented which describe the status of mercury concentrations in existing trophic levels. The potential hazards of Elephant Butte fish to human health are discussed. (Creel-New Mexico)
W74-03899

A COMPARISON OF INVERTEBRATE DRIFT IN THREE MICHIGAN STREAMS,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5B.
W74-03902

POTAMOLOGICAL EFFECTS OF FISH HATCHERY DISCHARGE ON THE JORDAN RIVER, NORTHERN LOWER MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
A. T. Szluha.
Available from the National Technical Information Service as PB-227 459; $6.75 in paper copy, $1.45 in microfiche. Ph.D. Thesis, 1972. 62 p, 11 fig, 10 tab, 37 ref, append. OWRR C-1663(3153)(6), C-2205(3386)(4) and C-3381(3723)(7). 14-31-0001-3153, 14-31-0001-3386.

Descriptors: Potamology, Fish hatcheries, Channel morphology, Metabolism, *Periphyton, *Michigan, *Lake trout, Settling basins, Water pollution effects.
Identifiers: Jordan River(Mich), Ecological impact, *Fish hatchery wastes, *Oxygen balance.

The Bureau of Sport Fisheries and Wildlife is operating a lake trout (Salvelinus namaycush) hatchery in the Jordan River Valley utilizing two systems of springs for its water supply. Until the spring of 1972 the hatchery had been discharging its waste into the Jordan River without any formal treatment. During the winter of 1971 and 1972 two settling basins were built to remove 80-95% of settleable solids from the wastewater. In order to evaluate the ecological impacts of the hatchery wastes on the receiving stream, periphytic production rates and the oxygen balance were determined at locations above and below the outfalls during March through June 1971 and again in 1972. Periphytic production rates increased exponentially during the study periods. Mean productivity rates were seven times greater below the outfalls than at the control station above the discharge in 1971, and five times greater in 1972. Diurnal oxygen concentrations and temperature curves were obtained from sections above and below the hatchery discharges in order to estimate gross primary productions and community respirations. However, undeterminable ground and surface water accrual with oxygen concentrations usually lower than in the Jordan River distorted rates of changes of oxygen concentrations which were necessary to calculate gross primary production and community respiration. A primary production index was calculated from the diurnal oxygen curves. These data indicated that the oxygen balance in the Jordan River was not effected significantly by the hatchery effluent either before or after installation of settling basins.
W74-03903

THE DYNAMICS OF BROWN TROUT (SALMO TRUTTA) AND SCULPIN (COTTUS SPP.) POPULATIONS AS INDICATORS OF EUTROPHICATION,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
W. L. Smith.
Available from the National Technical Information Service as PB-227 455; $5.75 in paper copy, $1.45 in microfiche. Ph.D. Thesis, 1972. 43 p, 3 fig, 19 tab, 33 ref, 5 append. OWRR C-3381(3723)(5) and C-1663(3153)(5). 14-31-0001-3723.

Descriptors: *Fish populations, Fish reproduction, Sexual maturity, *Brown trout, Michigan, *Eutrophication, *Sculpins.
Identifiers: Jordan River(Mich), Au Sable River(Mich), Secusl maturity.

Brown trout and sculpin populations were studied in three variously perturbed stream sites in northern Michigan. Intraspecific comparisons were made of several aspects of population dynamics including the intrinsic rate of natural increase (r). The upper Jordan River, nearly pristine and with high population densities, exhibited r values judged adequate for maintenance of the populations. The other sites were compared with this baseline. The moderately perturbed lower Jordan River had less population densities and survival but greater mean fecundities for both species. This resulted in a positive r for the trout but the birth rate of the sculpins could not compensate for the death rate and the population was declining. The Au Sable River, the most eutrophic and suspected of being marginal trout water, also had lesser population densities and greater mean fecundities than the upper Jordan. Survivorship of the sculpins was sufficient to yield a positive r.

However, the low survival of the trout resulted in a strongly negative r, suggesting inability of the population to sustain itself. It appeared that moderate eutrophication enhanced the reproductive capability of trout but beyond a certain level of perturbation the effects were damaging. Fishing pressure, genetics, and species interaction could also have influenced the results. The intrinsic rate of natural increase of short-lived, coldwater fish species should be a uaeful tool in monitoring water quality, especially if studies continue through several generations.
W74-03904

BENTHIC MACROINVERTEBRATE DIVERSITY IN THREE DIFFERENTIALLY PERTURBED MICHIGAN STREAMS,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
S. J. Reger.
Available from the National Technical Information Service as PB-227 615; $7.00 in paper copy, $1.45 in microfiche. M.S. Thesis, 1973. 60 p, 3 fig, 18 tab, 41 ref, append. OWRR C-3381(3723)(8).

Descriptors: *Invertebrates, *Systematics, *Michigan, *Standing crops, *Biomass, Water quality, *Nutrients, Discharge frequency, Watersheds(Basins).
Identifiers: Jordan River(Mich), Au Sable River(Mich), Red Cedar River(Mich), Annual cycle, Grayling(Mich).

The macroinvertebrate community structures of three Michigan streams were examined through an annual cycle. Study sites were located above and below known sources of human disturbance on each stream. Taxonomic composition, standing crops, and diversity of both numbers of individuals and biomass were used in an attempt to describe the effects of cultural development on the streams. Macroinvertebrate diversity indices calculated using numbers of individuals were found to be more sensitive than other indicators of human perturbation, particularly when comparing sections of any given stream. The city of Grayling's sewage treatment plant's conversion of land disposal resulted in increased diversity of the lower Au Sable River from an earlier study. This change was not noticeable by direct measurement of chemical water quality parameters. Nutrient enrichment appeared to result in an increased production of macroinvertebrates, followed closely by a decreased diversity of the community. Factors other than enrichment also were shown to be important in controlling the composition and diversity of the communities. Most important of such factors were substrate types and stability and variation in discharge; these may or may not have been a result of human activity in the watersheds.
W74-03905

CAUSES AND CONTROL OF ALGAL BLOOMS IN SPIRITWOOD LAKE, NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Zoology.
J. J. Peterka, and J. W. Held.
Available from the National Technical Information Service as PB-227 675; $4.25 in paper copy. North Dakota Water Resources Research Institute, Report WI-312-001-72, February 1972. 18 p, 3 fig, 3 tab, 17 ref. OWRR B-001-NDAK(1). 14-01-0001-882.

Descriptors: *Algae control, *Eutrophication, *Limiting factors, North Dakota, Nutrients, Nitrogen, Phosphorus, Bottom sediment, Agricultural runoff, Domestic wastes, Surface runoff, Groundwater, Farm wastes, Leaching, Algicides, Recreation, Pumping.
Identifiers: *Spiritwood Lake(N.D.), Nutrient sources, Hydrothol, Cutrine, Nutrient budget.

In an attempt to only reflect general trends, the major sources of nitrogen and phosphorus entering Spiritwood Lake, North Dakota were identified and the influence of nitrogen, phosphorus and algicides upon algal blooms determined. Of the estimated nitrogen and phosphorus entering the lake during spring runoff, 62% of the nitrogen and 95% of the phosphorus appeared to come from diffuse land surface sources (drainage from fields and grasslands). Groundwater sources of nitrogen and phosphorus may be particularly important and should be identified. Nitrogen, and to a lesser degree phosphorus, in livestock excrement are potentially important contributors to nutrient enrichment. Experiments indicated that additions of inorganic nitrogen increased algal production whereas phosphorus was inhibiting. Cutrine, the algicide most effective in field experiments, contains copper, which accumulates in bottom muds, and, being potentially toxic to organisms, should be used with utmost precaution. A relatively inexpensive procedure for removing some nutrients which accumulate near the lake bottom during late summer would be to pump this nutrient-rich water for irrigation use. It seems more feasible to reduce plant nutrient inputs than to spend money on algicides and weed harvesting programs. (Jones-Wisconsin)
W74-03906

THE ECONOMIC IMPACT OF THE BAN ON COMMERCIAL FISHING ON LAKE PICKWICK,
Auburn Univ., Ala. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-03910

EFFECT OF ARTIFICIAL WATER AERATION ON BASIN ALGAL FLORA, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. A. Sirenko, N. V. Avil'tseva, and V. M. Chernousova.
Gidrobiol Zh. Vol 8, No 1, p 68-72. 1972. Illus. (English summary).
Identifiers: *Aeration(Artificial), Algae, Algal flora, Bloom, Oxygen, Saturation, Stratification, Cyanophyta.

Water aeration using bubbling systems of air results in destratification of the basin and creates a uniform oxygen saturation of the whole water column. This favors the liquidation of the stagnant zones with a low oxygen content in bottom layers. Under the effect of aeration, the character of the basin algal cenoses changes: the blue-green algae causing water 'bloom' are eliminated to a considerable extent, the development of other groups intensifies. Simultaneously a considerable improvement of water quality is observed.--Copyright 1973, Biological Abstracts, Inc.
W74-03918

YELLOW-GREEN ALGAE OF WASTES, (IN UKRANIAN),
Kharkov State Univ. (USSR). Dept. of Lower Plants.
For primary bibliographic entry see Field 5A.
W74-03919

OHIO MUSSEL FISHERIES INVESTIGATION. PART I: MUSSEL STUDIES. PART II: WATER CHEMISTRY AND SEDIMENT ANALYSES. PART III: PLANKTON SURVEY,
Eastern Michigan Univ., Ypsilanti.
J. M. Bates.
Available from the National Technical Information Service as COM73-10145; $6.00 in paper copy, $1.45 in microfiche. Ohio Division of Wildlife, Columbus; and National Marine Fisheries Service, Washington, D.C., completion report November 1970. 355 p, 142 fig., 51 tab, 40 ref, 1 append. NOAA 4-28-R. 14-17-0004-433.

Descriptors: *Ohio, *Mussels, *Fisheries, *Water chemistry, *Sediments, *Analysis, *Plankton, Management, Shellfish, Clams, Chemical analysis, Rivers, Systematics, History, Harvesting, Parasitism, Surveys, Bottom sediments, Water quality.
Identifiers: *Muskingum River(Ohio).

The Muskingum River, Ohio today supports what are probably the finest fresh water mussel stock in the world. It is completely possible that stocking programs could be instituted to reconstitute commercially valuable populations in certain streams. The present high market demand for shells has developed largely during the past two decades due directly to demand created by the Japanese cultured pearl industry. The location and extent of mussel beds, species composition and density, rate of harvest, rate of recruitment, sex, age, and size composition of populations, and other basic biological information were determined. Investigations into basic phenomena of shell formation, particularly composition of the extra-pallial fluid, were undertaken. A water quality survey dealing with 13 chemical and 5 physical parameters was conducted in the river. Introduction of dams established an aquatic environment quite different from that found in non-impounded streams, a condition well illustrated by the physical nature of the sediments. Data presented illustrate importance of the biogeochemical nature of the substrate as a regulatory factor in aquatic environments. An intensive plankton survey was pursued defining dynamics of plankton populations in the 90-mile stretch from Ellis to Marietta, Ohio. (See W74-03932 thru W74-03934) (Jones-Wisconsin)
W74-03931

OHIO MUSSEL FISHERIES INVESTIGATION. PART II: WATER CHEMISTRY AND SEDIMENT ANALYSES,
Eastern Michigan Univ., Ypsilanti.
J. M. Bates.
Ohio Division of Wildlife, Columbus; and National Marine Fisheries Service, Washington, D.C., completion report November 1970, p 109-211, 27 fig, 6 tab, 14 ref. 4-28-R. 14-17-0004-433.

Descriptors: *Ohio, *Mussels, *Fisheries, *Water chemistry, *Sediments, Rivers, Analysis, Surveys, Bottom sediments, Phosphates, Tributaries, Clams, Water quality, Dissolved oxygen, Carbon dioxide, Hardness(Water), Calcium, Conduction, Nitrates, Sulfates, Chlorides, Cations, Hydrogen ion concentration, Alkalinity, Velocity.
Identifiers: *Muskingum River(Ohio), Lowell(Ohio), Devola(Ohio), Dillon Reservoir(Ohio).

A water quality survey dealing with thirteen chemical and five physical parameters was conducted in the Muskingum River, Ohio. Introduction of dams established an aquatic environment quite different from that found in non-impounded streams. This condition is well illustrated by the physical nature of the sediments, which is a direct result of the energy level of the river at any point. The sediment is described in terms of physical size of the particles. The hydrogen ion concentration was slightly basic with an average pH of 7.8. Dissolved oxygen averaged 92% saturation and was fairly constant for the portion studied. Mussel beds were located below dams for a distance of one to two miles downstream. Physical parameters of sediments were definite factors in determining if a sufficiently large mussel population could be maintained to constitute a mussel bed. A bottom sediment study was conducted to establish differences in the physical nature of the substrate at one section of the river. Areas in which mussel beds exist were compared to areas not supporting mussel beds. Data presented illustrate importance of the biogeochemical nature of the substrate as a regulatory factor in aquatic environments. (See also W74-03931) (Jones-Wisconsin)
W74-03933

OHIO MUSSEL FISHERIES INVESTIGATION. PART III: PLANKTON SURVEY,
Eastern Michigan Univ., Ypsilanti.
J. M. Bates.
Ohio Division of Wildlife, Columbus; and National Marine Fisheries Service, Washington, D.C., completion report November 1970, p 220-330, 8 fig, 15 tab, 26 ref, 1 append.

Descriptors: *Ohio, *Plankton, *Rivers, Mussels, Fisheries, Density, Nannoplankton, Cyanophyta, Diatoms, Zooplankton, Chlorophyta, Surface waters, Bottom sampling, Canals, Dams, Rotifers, Systematics, Light penetration, Spatial distribution, Temporal distribution, Oxygen, Carbon dioxide, Hydrogen ion concentration, Calcium, Nitrogen, Phosphorus.
Identifiers: *Muskingum River(Ohio), Ellis(Ohio), Marietta(Ohio), Density-diversity, McConnelsville(Ohio), Melosira, Synedra, Diatoma, Brachionus, Chlorococcales, Cyclotella, Fragilaria, Navicula.

During an investigation of mussel populations in Muskingum River, Ohio, an intensive plankton survey was conducted for one year in an attempt to define plankton population dynamics in that 90-mile stretch from Ellis to Marietta, Ohio. Physical and chemical parameter influences on observed density-diversity patterns were investigated. Plankton population of the Muskingum River was primarily: Bacillariophyceae, 14 taxa; zooplankton, 14 taxa; Clorophyta, 83 taxa; and Cyanophyta, 15 taxa. Variations in density and diversity of this population differed not only temporally but also spatially (vertically and most important, between the upper reaches and the river mouth). These variations were apparently affected by physical factors (light, turbidity, and water level) and/or biological factors. Of the chemical parameters analyzed none were clearly limiting. Greatest variations in density occurred in Bacillariophyceae and zooplankton; they each showed two peak densities both of which occurred during the same period, but at different localities. The first peak density of the Bacillariophyceae was caused by the genera Melosira and Synedra while the second was caused by Diatoma and Synedra. Variation within the zooplankton was directly proportional to the rotifer population, specifically Brachionus, which underwent a high rate of reproduction during June. (See also W74-03931) (Jones-Wisconsin)
W74-03934

A COMPARATIVE STUDY OF PLANKTON RESPIRATION IN AN ACID POLLUTED LAKE AND ITS ACID FREE EMBAYMENTS,
West Virginia Univ., Morgantown. Dept. of Biology.
W. T. Diehl.
Proceedings of West Virginia Academy of Sciences, Vol 44, No 1, p 24-32, 1972. 4 tab, 13 ref.

Descriptors: *Plankton, *Respiration, *Acid mine water, *Reservoirs, West Virginia, Environmental gradient, Hydrogen ion concentration, Iron, Acidic water, Backwater, Chemical properties, Water pollution.
Identifiers: *Cheat Lake(W.Va.), Species diversity.

The community respiration of Cheat Lake, West Virginia, an acid polluted lake and two acid free embayments, was measured. The hypothesis was examined that plankton community respiration varies significantly between the lake and its embayments, manifested by lower community respiration in the lake. Respiration measurements were obtained by suspending dark bottles. Of the three sampling sites, Morgan's Run (pH 6 to 7) and Ruble's Run (pH 6 to 7.2) are backwaters and the water immediately above the dam is pH 3.5 to 5.8. Data analyses indicate that acid polluted waters at the dam either inhibit respiration of existing species or reduce planktonic densities, producing similar results. The following mean planktonic community respiration rates were determined as milligrams oxygen per liter per day: 0.90 near the dam, 1.47 in Ruble's Run, and 2.42 in Morgan's Run. At the dam station it appears that acid pollution limits plankton abundance, thus producing lower community respiration rates. No acid pollution is evident in either backwater. (Jones-Wisconsin)
W74-03935

AN ECOLOGICAL EVALUATION OF A THERMAL DISCHARGE. PART II: THE DISTRIBUTION OF PHYTOPLANKTON AND PRIMARY PRODUCTIVITY NEAR THE WESTERN SHORE OF LAKE ERIE,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
M. D. Marcus.
Michigan State Univ., Institute of Water Research, Thermal Discharge Series Technical Report No. 14, May 1972. 96 p, 15 fig, 16 tab, 53 ref, 1 append.

Descriptors: *Baseline studies, *Distribution, *Phytoplankton, *Primary productivity, *Lake Erie, Diurnal, Systematics, Thermal powerplants, Water pollution, Population, Seasonal, Diatoms, Chlorophyta, Cyanophyta, Succession, Zooplankton, Light penetration, Turbidity, Phosphorus, Limiting factors, Eutrophication, Nitrogen, Nutrients, Respiration.
Identifiers: *Western Lake Erie, Species diversity, River Basin.

Baseline information is established on phytoplankton composition, productivity, and distribution. Phytoplankton populations and associated primary productivity of near shore areas of western Lake Erie are examined and compared to two shoreline areas to determine distributional variations in population parameters. Samples were collected at four week intervals May to November, 1970. Nearly 200 phytoplankton species were observed. Spring populations, dominated by diatoms, were displaced during summer by increasing green and blue-green algae. Greatest species diversities commonly occurred at inshore areas; lowest equitability was found in the River Raisin. Least phytoplanktonic volumes, blue-green algal volumes, mean individual volume, and primary productivities were generally observed in the river. Greatest phytoplanktonic numbers, volumes, and productivities, as well as volumes of diatoms and green algae were most frequently observed in the man-made embayment. The lake was generally intermediate in most categories but usually had least community respiration. Water temperatures appeared a major factor regulating class composition in spring and late fall. Light apparently influenced phytoplanktonic productivity through photoperiod variation and limited light penetration. Data suggest that increased nutrient enrichment leads to decreased mean individual sizes of the phytoplankton and increased species diversities; these relationships contrast with results obtained in earlier ecological studies. (Jones-Wisconsin)
W74-03936

LAKE KINNERET: PLANKTONIC POPULATIONS DURING SEASONS OF HIGH AND LOW PHOSPHORUS AVAILABILITY,
Kinneret Limnology Lab., Tiberias (Israel).
T. Berman, U. Pollingher, and M. Gophen.
Verhandlungen Internationalen Vereinigung Limnologie, Vol 18, p 558-598, 1972. 3 fig, 6 tab, 21 ref.

Descriptors: *Nitrogen, *Plankton, *Phosphorus, *Zooplankton, Eutrophication, Phytoplankton, Pyrrhophyta, Cyanophyta, Copepods, Crustaceans, Rotifers, Chlorophyta, Bacteria, Algae, Limiting factors, Nutrients, Chrysophyta.
Identifiers: *Lake Kinneret(Israel), Peridinium, Microcystis, Rhodomonas, Melosira, Erkenia subaequiculiata, Keratella cochlearis, Elakatothrix gelatinosa, Cosmarium, Tetraedron, Chroococcus limneticus.

Lake Kinneret serves as the primary reservoir of Israel's National Water carrier supplying over a third of the country's irrigation and drinking water. It supports an active commercial fishing industry, and, around its shores, tourist facilities are expanding. Studies suggest that, although adequate phosphorus is available during the main algal bloom period (January-May), this nutrient may become limiting in late summer and autumn. Phosphorus availability was assessed by several methods: relative phosphatase activities with p-nitrophenyl phosphate and endogenous substrates, hot water extraction of orthophosphate from plankton, and nutrient enrichment experiments. Despite seasonal changes in planktonic populations, alkaline phosphatase activities were always predominantly associated with small organisms, presumably algae and bacteria. The main bloom-forming algae are generally Pyrrhophyta (Peridinium cintum fa. westii) although occasionally Cyanophyta (Microcystis sp.) have predominated. Among zooplankton, maximum numbers of Copepoda, Cladocera, and Rotifera are observed at the bloom period and phosphorus appears to be abundant. However, by late summer a shortage of epilimnic phosphorus may be limiting algal growth. By then the main phytoplankton biomass consists of Chlorophyta and Cyanophyta and zooplankton numbers are minimal. (Jones-Wisconsin)
W74-03937

AN ANALYSIS OF THE ZOOPLANKTON COMMUNITY IN AN ACID POLLUTED RESERVOIR,
West Virginia Univ., Morgantown. Dept. of Biology.
J. L. Bible.
Proceedings of West Virginia Academy of Sciences, Vol 44, No 1, p 32-39, 1972. 5 tab, 17 ref.

Descriptors: *Zooplankton, *Biological communities, *Reservoirs, *Acid mine water, West Virginia, Water pollution effects, Backwater, Chemical properties, Acidic water, Hydrogen ion concentration, Hardness(Water), Alkalinity, Biomass, Conductivity, Daphnia, Crustaceans, Reservoirs.
Identifiers: *Cheat Lake(W.Va.), Brachionus cf. urceolaris, Diaptomus, Mesocyclops edax, Daphnia parvula, Ceriodaphnia, Bosmina longirostris.

Measurements at stations in the backwaters and main reservoir of Cheat Lake, West Virginia were made to determine if the stations differed significantly on the basis of chemical parameters associated with acid mine pollution. The zooplankton community was studied at each station and chemical and biological parameters were compared. Since its construction in 1929, Cheat Lake has been polluted by acid mine drainage. The reservoir's three backwaters are partially isolated from the main reservoir and do not receive acid except occasionally from the main reservoir. Sampling sites in the reservoir were opposite the coal pile, five miles above the dam, and one-quarter mile above the dam; in the backwaters they were in the middle of Rubles Run and in the middle of Morgan Run. The reservoir stations were similar with low pH and alkalinity and high methyl orange acidity, total acidity and conductivity. The backwaters were nonacid with relatively high pH and alkalinity and low methyl orange acidity, total acidity and conductivity. Community coefficients indicate zooplankton communities in the backwaters are similar but differ from zooplankton in the main reservoir. In addition, zooplankton biomass was much greater in the backwaters. (Jones-Wisconsin)
W74-03938

OME ENVIRONMENTAL FACTORS DETER-
IINING THE PRIMARY PRODUCTION OF
HE MOZHAISK RESERVOIR, (IN RUSSIAN),
loscow State Univ. (USSR).
u. M. Lebedev, and E. L. Shirokova.
iol Nauki. Vol 15, No 6, p 116-118, 1972. Illus.
lentifiers: Environmental conditions, *Primary
roduction, Reservoirs, *USSR(Mozhaisk Reser-
oir).

n the basis of data from observations on the
lozhaisk (USSR) reservoir in 1967-1969 an equa-
on for calculating primary production was
erived. The standard deviations between the ob-
ervations and the calculated values was plus or
inus 30%.--Copyright 1973, Biological Abstracts,
nc.
/74-03939

UMMARY REPORT OF THE AGREED MONI-
ORING PROJECTS ON EUTROPHICATION
F WATERS.
rganization for Economic Co-Operation and
evelopment, Paris (France). Water Management
ection Group.
eport 89778, 1973. 21 p, 1 fig, 4 append.

escriptors: *Eutrophication, *Water quality con-
ol, *Measurement, Hydrologic data, Monitoring,
hysical properties, Chemical properties, Biologi-
l properties, Geomorphology, Ecology, Sam-
ling, Lakes, Reservoirs.
lentifiers: *OECD, Alpine project, Nordic pro-
ct, Reservoir project, North American project.

n order to further enable member countries of the
rganisation for Economic Co-operation and
evelopment to decide on the best policies for pol-
tion and eutrophication control, a common
ystem of measurements and monitoring of waters
as established. The system of measurement was
ivided into three categories--physical, chemical,
nd biological--which are then subdivided into
ssential' and 'desirable.' This measurement
ystem would make available reliable and quan-
fied hydrological data. A regional approach
owards eutrophication was developed, with the
oluntary association of the participating institutes
four regional projects: (1) Alpine Project con-
sting of Austria, France, Germany, Italy, and
witzerland; (2) Nordic Project including
enmark, Finland, Norway, and Sweden; (3)
eservoir Project including Belgium, Germany,
etherlands, Spain, and the United Kingdom; and
) North American Project including Canada and
ie United States. The specific bodies of water to
e considered in each project are listed in Appen-
ix II. The program will be conducted for a period
f four years, with a special review and assess-
ent planned at the end of the first year. (Pinsky-
/isconsin)
/74-03940

PECIES DIVERSITY OF CHYDORID FOSSIL
OMMUNITIES IN THE MISSISSIPPI VALLEY,
/ayne State Univ., Detroit, Mich. Dept. of Biolo-
y.
De Costa.
ydrobiologia, Vol 32, No 3-4, p 497-512, 1968. 1
g, 15 tab, 16 ref.

escriptors: *Crustaceans, *Paleolimnology,
Mississippi River Basin, Distribution, Mathe-
atical studies, Lakes, Oxbow lakes, Artificial
kes, Lake sediments, Eutrophication, Turbidity,
ittoral, Biological communities.
lentifiers: *Species diversity, *Chydorid fossils,
iversity indices, Shannon-Weaver equation,
roken stick model.

he importance of chyroid fossil fauna to
aleolimnologists prompted new analyses of earli-
data. Species diversity of the chyroid fossil
una (shells and head shields) in offshore surficial
ke sediments of 45 lakes in the Mississippi Val-
ley are described. Lakes are grouped as oxbow, artificial, and 'natural' (those formed by natural means but not oxbows). Diversity was calculated according to the Shannon-Weaver information theory equation. Where diversity and equitability components were low it usually was due to Chydorus sphaericus superabundance. While the number of species seemed greater in the north, species diversity was significantly greater in the transect's southern part. Chyroid fossil populations were correlated to neither conservative parameters of the water nor sediment parameters. Populations recovered were significantly greater for the natural lakes compared with the other two groups. Species diversity was negatively correlated to population size in natural lakes, while the opposite positive correlation was found for the other lakes. Correlations found between species diversity and sedimentary parameters could be caused by high turbidity in artificial and oxbow lakes, perhaps retarding eutrophication. This factor, absent in natural lakes, has resulted in rapid eutrophication causing loss of diversity and instability in the chyroid communities. (Jones-Wisconsin)
W74-03941

PRIMARY PRODUCTION AND DESTRUCTION OF ORGANIC MATTER IN 2 LAKES OF DIFFERENT TYPES, (IN RUSSIAN),
Gorkii State Univ. (USSR). Dept. of Zoology.
M. A. Petrova, A. G. Pogodin, and T. S. Elagina.
Biol Nauk. Vol 15, No 3, p 17-20, 1972. Illus.
Identifiers: Bacteria, Lakes, *Organic matter, Phytoplankton, *Primary production, Protozoa, Respiration, *Eutrophic lake, *oligotrophic lakes.

In eutrophic and oligotrophic lakes the gross primary production is about the same, since in oligotrophic lakes the thickness of the trophogenic layer is greater and the intensity of photosynthesis decreases less markedly with depth. A secondary oligotrophic lake is considerably inferior to a eutrophic lake with respect to indices of destruction, since in an oligotrophic lake there is practically no influx of organic matter from without and little planktonogenic detritus (the substrate for the development of bacteria decomposing organic matter). The role of zooplankton in the destruction of organic matter in both lakes is small. Respectively 4.1 and 3.2% of the gross primary production of phytoplankton is expended for its respiration. Among the zooplankton the protozoa are most important in the decomposition of organic matter.--Copyright 1973, Biological Abstracts, Inc.
W74-03944

PRELIMINARY SURVEY OF GOLCUK, A EUTROPHIC MOUNTAIN LAKE IN WESTERN TURKEY,
Aegean Univ., Bornova (Turkey).
R. Geldiay, and I. U. Tareen.
Ege Universitesi Fen Fakultesi Ilmi Raporlar Serisi No. 138, 1972. 21 p, 7 fig, 4 tab, 13 ref.

Descriptors: *Eutrophication, *Lakes, *Limnology, Urban drainage, Physical properties, Seston, Biomass, Productivity, Hydrogen ion concentration, Lake morphology, Phytoplankton, Agricultural runoff, Oxygen, Algae, Thermal properties, Light penetration, Zooplankton, Carbon dioxide, Aquatic plants, Systematics.
Identifiers: *Lake Golcuk(Turkey), Montane lakes.

A one year limnological study was made of Golcuk Lake, a mountain lake in western Turkey. Maximum summer temperature was 22.7C and winter temperature was not below 4C. Usually alkaline, it becomes acidic in September as production of carbon dioxide is immense due to photosynthetic activities of phytoplankton and waste decomposition. It is highly eutrophic due to urban drainage from an adjacent village and agricultural runoff. Hydrogen sulfide was detected in September. Algal blooms of Microcystis aeruginosa, Anabaena flos-aquae, Spirogyra, and Oscillatoria rubescens occurred. Since the bottom is composed mainly of sand, bottom fauna were scarce in comparison with the intensive density of the zooplankton. Among the perennial species Lionotus, Stentor, Filinia longiseta, Bosmina longirostris, Cyclops, and Arctodiaptomus pectinicornis were found. Prominent among the zooplankton, Copepoda peaked in August. Rotifera and Cladocera showed the maxima in June. Hydrogen sulfide causes decline of zooplankton population. In 1967, 120 fish, species Siluris gelanis, were introduced, whereas Cyprinus carpio was native. Potamogeton natans, Phragmites communis, Ranunculus aquatilis, and Myriophyllum verticillatum were the most common aquatic plants. (Jones-Wisconsin)
W74-03946

NUTRIENT BUDGETS IN RIVERS,
Water Pollution Research Lab., Stevenage (England).
M. Owens, J. H. N. Garland, I. C. Hart, and G. Wood.
In: 'Conservation and Productivity of Natural Waters,' Symposia of the Zoological Society of London, No 29, p 21-40, 1972. 8 fig, 1 tab, 20 ref.

Descriptors: *Chlorides, *Nutrients, *Rivers, *Nitrogen, Water quality, Potassium, Water pollution sources, Estimating, Drainage, Agricultural runoff, Urban runoff, Forecasting, Mathematical studies, Runoff.
Identifiers: *Nutrient budget, River Great Ouse(England), River Trent(England), Inorganic nitrogen.

Major source of inorganic nitrogen and chloride in rivers draining primarily agricultural land, is drainage, whereas in urbanized and industrialized catchments, effluents are the major source. Estimations have been made of mean loads derived from land for a number of catchments in England and Wales. There is an apparent inverse relationship of the average concentrations of inorganic nitrogen and chloride in the drainage waters from these catchments to the residual runoff per unit of catchment. A simple relation between population density and land use has been used to calculate proportions of inorganic nitrogen and chloride derived from various sources within a catchment and the average and varying concentrations of these substances in the river. Throughout the year, reasonable agreement between calculated and observed chloride concentrations was obtained for the River Great Ouse and the River Trent. In both rivers, calculated concentrations of inorganic nitrogen generally exceeded those observed during summer while reasonable agreement was obtained at other times of the year. Possible explanations of this discrepancy between calculated and observed concentrations of inorganic nitrogen are discussed, including utilization by aquatic plants and algae, denitrification, and loss of gaseous ammonia. (Jones-Wisconsin)
W74-03947

PROTEOLYTIC ACTIVITY OF SAPROPHYTIC MICROFLORA IN THE DNEPRODZERZHINSKOE RESERVOIR, (IN RUSSIAN),
N. M. Karpushin, and G. B. Mel'nikov.
Gidrobiol Zh. Vol 8, No 3, p 76-79, 1972. Illus.
Identifiers: Enzymes, *Flora(Saprophytic), Pollution, Protease, *Proteolytic activity, Reservoirs, *USSR(Dneprodzerzhinskoe reservoir), Self-purification.

The potential proteolytic activity of saprophytic microflora from surface and bottom waters (Dneprodzerzhinoskoe reservoir, USSR) and distribution patterns for proteolytic bacteria were investigated. Seasonal variations in the number of saprophytic microflora were shown. The potential proteolytic activity and number of proteolytic bac-

teria did not vary substantially between surface and bottom layers. A high potential activity in the bottom zone of the lower tail bay and in the upper tail bay was shown. The dynamics of potential proteolytic activity did not correspond to the total number of saprophytes with proteolytic activity, indicating that proteolytic enzymes from deterioration of other hydrobionts, probably from blue-green algae, were present. The intensity of bacterial activity measured by the zone of proteolysis on hard medium with skim milk showed that proteolytic bacteria were powerful producers of protease and confirmed their leading role in hydrolysis of protein compounds. The potential proteolytic activity of saprophytic bacteria can be used to test for the degree and nature of organic water pollution as well as for the existence of self-purification processes.--Copyright 1973, Biological Abstracts, Inc.
W74-03949

CATASTROPHE BREWING IN QUIET WATERS,
National Wildlife Federation, Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-04025

ROTIFER PLANKTON IN BRACKISH AND FRESHWATER LOCALITIES IN CENTRAL SWEDEN,
Uppsala Univ. (Sweden). Inst. of Zoology.
B. Pejler.
Oikos, Vol 23, No 3, p 416-419, 1972, Illus.
Identifiers: Brackish water, Freshwater, *Rotifer plankton, *Sweden, *Synchaeta-gyrina.

The rotifer plankton was studied in some freshwater and brackish water localities in easternmost Central Sweden. Concerning the general character and rotifer plankton, some of the lakes agreed with the type previously studied, e.g., on the island of Gotland and designated as 'oligotrophic--highly calcareous.' Some of the lakes were recently separated from the sea, and in some others brackish water still intrudes at times. In such localities Synchaeta gyrina Hood was abundant. This rotifer evidently constitutes an edge species between brackish and fresh water. In the purely brackish localities, on the other hand, the species composition was similar to that found elsewhere in Baltic zooplankton.--Copyright 1973, Biological Abstracts, Inc.
W74-04041

PRIMARY PRODUCTIVITY IN RELATION TO CHEMICAL PARAMETERS IN CHEAT LAKE, WEST VIRGINIA,
West Virginia Univ., Morgantown. Dept. of Biology.
R. D. Volkmar.
Proceedings West Virginia Academy of Science, Vol 44, No 1, p 14-22, 1972. 4 tab, 15 ref.

Descriptors: *Primary productivity, *Chemical properties, *Acidic water, West Virginia, Backwater, Reservoirs, Conductivity, Hydrogen ion concentration, Alkalinity, Carbon, Acid mine water, Bicarbonates, Regression analysis, Water pollution effects, Light penetration, Oligotrophy, Nannoplankton.
Identifiers: *Cheat Lake(W. Va.).

Cheat Lake reservoir, as a result of water seepage through the numerous coal mines in the Cheat watershed of West Virginia, receives a heavy load of acid from several tributaries. Its three backwater areas have no coal mines in their watersheds, are partially isolated from the main basin, and are relatively free of mineral acid. The main lake showed high acidity and conductivity, and low pH, alkalinity, and inorganic carbon, indicating presence of acid mine wastes. The backwater areas have a pH near neutrality with low acidity and higher levels of bicarbonate alkalinity and inorganic carbon, indicating presence of acid mine wastes. The backwater areas have a pH near neutrality with low acidity and higher levels of bicarbonate alkalinity and inorganic carbon to be an important nutrient in controlling productivity in the Rubles Run backwater. As indicated by the regression equation for productivity at the dam station, the presence of mineral acid exerts considerable influence on carbon assimilation. Although the rates of carbon assimilation at the dam station and the Rubles Run backwater are not significantly different, they are influenced by different factors. Inorganic carbon was the most important variable controlling productivity in the Rubles Run backwater. (Jones-Wisconsin)
W74-04089

DIET OF THE MESOCYCLOPS LEUCKARTI (CLAUS) AND LEPTODORA KINDTII (FOCKE) POPULATIONS IN LAKE ILMEN, (IN RUSSIAN),
Gosudarstvennyi Nauchno-Issledovatelskii Institut Ozernogo i Rechnogo Rybnogo Khozyaistva, Leningrad (USSR).
For primary bibliographic entry see Field 2H.
W74-04091

PRODUCTIVITY OF THE RIVER THAMES AT READING,
Reading Univ. (England). Dept. of Zoology.
A. D. Berrie.
Symposia of the Zoological Society of London, No 29, p 69-86, 1972. 7 fig, 6 tab, 16 ref.

Descriptors: *Productivity, *Ecology, Trophic level, Nutrients, Suspended load, Organic matter, Phytoplankton, Diatoms, Respiration, Benthic fauna, Benthic flora, Aquatic plants, Benthos, Mussels, Fish, Detritus, Rotifers, Crustaceans, Photosynthesis, Invertebrates, Fish management, Fecundity, Diptera, Zooplankton, Energy.
Identifiers: *River Thames(England), *Reading(England), River Kennet(England).

A stretch of River Thames was studied at all trophic levels. For most of its length it is dredged for navigation to a minimum depth of 2 m and flow is regulated by locks and weirs at about 5 km intervals. At Reading it is a eutrophic lowland river, 40 to 80 m wide, with a center mean depth of about 3 m. It carries considerable quantities of nutrients and suspended organic matter but is well oxygenated. A rich phytoplankton population develops in spring and summer usually with a spring bloom of centric diatoms. Over the year primary production of phytoplankton greatly exceeds respiration. Various aspects of the ecology of this part of the river have been studied for twelve years. Plants, invertebrates, and fish are discussed. The annual production of fish is quite high but much is attributable to young fish in their first few months when high mortality occurs; surviving fish depend heavily on allocthonous materials and organic detritus. Aquatic macrophytes provide an important habitat for the invertebrate fauna, and care should be taken to ensure their preservation. Quality of fish for angling is poor, and management techniques must be developed for improvement. (Jones-Wisconsin)
W74-04093

THE RELATION BETWEEN THE SYNTHESIS OF INORGANIC POLYPHOSPHATE AND PHOSPHATE UPTAKE BY CHLORELLA VULGARIS,
Oxford Univ. (England). School of Botany.
P. A. Aitchison, and V. S. Butt.
Journal of Experimental Botany, Vol 24, No 80, p 497-510, 1973. 8 fig, 1 tab, 27 ref.

Descriptors: *Cytological studies, *Phosphates, *Synthesis, Chlorella, Absorption, Algae.
Identifiers: *Chlorella vulgaris, *Polyphosphate, Overcompensation.

Variations in the polyphosphate content of Chlorella vulgaris cells were studied with special reference to effect of phosphate levels in the culture medium. Two polyphosphate fractions were extracted, one soluble in cold 10% trichloroacetic acid, and one insoluble in acid but soluble in cold M KOH. Cell numbers were estimated using a haemocytometer. The fractions designated as polyphosphates were characterized by barium precipitation at pH 4.5, complete acid lability, partial alkaline lability, immobility on paper chromatograms, absence of ultraviolet absorption, and metachromasy. During a period of phosphate starvation, the phosphate content of Chlorella vulgaris cells which had been grown in phosphate-rich solution, decreased. The levels of most phosphate fractions declined, especially those of inorganic polyphosphates. On return to a phosphate medium, phosphate was taken up at a much faster rate than before starvation, with a striking increase in acid-soluble polyphosphate. The stimulated phosphate uptake and polyphosphate increase are shown to be specific effects of phosphate starvation, occurring only when excess phosphate was supplied and required light or air for the provision of energy. There was relatively little change in the concentrations of other phosphate fractions, including orthosphosphate. (Jones-Wisconsin)
W74-04094

AN ECOLOGICAL EVALUATION OF A THERMAL DISCHARGE. PART III: THE DISTRIBUTION OF ZOOPLANKTON ALONG THE WESTERN SHORE OF LAKE ERIE,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
T. F. Nalepa.
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.

Descriptors: *Baseline studies, *Distribution, *Zooplankton, Lake Erie, Water temperature, Powerplants, Systematics, Temporal distribution, Spatial distribution, Predation, Density, Canals, Water pollution, Biomass, Rotifers, Copepods, Crustaceans, Foods, Daphnia.
Identifiers: *Western Lake Erie, Raisin River(Mich), Discharge canal, Plum Creek(Mich).

Zooplankton distribution in near-shore areas of western Lake Erie were studied relative to temperature, oxygen, particulate organic carbon, primary productivity, suspended solids, and fish predation. Zooplankton density, biomass, and composition were compared in near-shore areas, a man-made discharge canal, a shallow creek embayment, and polluted River Raisin. It is apparent from relative values of biomass and density that mean biomass per individual differed among sampling stations. Individuals in the lake averaged twice the biomass of those in the discharge canal while the river was intermediate. Apparently distribution of total density and biomass are greatly affected by composition of the major taxa-rotifers, cladocerans and copepods. This, in turn, is apparently influenced by major physical or biological characteristics of the area. The fact that significant differences in biomass between depths was much more common than differences in density indicates that differences in vertical distribution of a few large species were primarily responsible for depth differences. Basic differences in zooplankton distributions were attributed mainly to variations in oxygen, food availability, and fish predation. Therefore, where abiotic conditions are tolerable, food availability and predation appear to be the most influential regulators of zooplankton in the near-shore areas of western Lake Erie. (Jones-Wisconsin)
W74-04095

NITROGEN AND PHOSPHORUS LOSSES IN SURFACE RUNOFF FROM AGRICULTURAL LAND AS INFLUENCED BY PLACEMENT OF BROADCAST FERTILIZER,
Agricultural Research Service, Morris, Minn. North Central Soil Conservation Research Center.
D. R. Timmons, R. E. Burwell, and R. F. Holt.
Water Resources Research, Vol 9, No 3, p 658-667, 1973. 6 fig, 3 tab, 26 ref.

Descriptors: *Nitrogen, *Phosphorus, *Agricultural runoff, Application methods, Fertilizers, Minnesota, Fertilization.

Concern has been expressed that possible nitrogen and phosphorus enrichment of surface runoff from agricultural land because of increased fertilizer use may be accelerating eutrophication of lakes and rivers. Losses of N and P occur in both the sediment and the water portions of surface runoff. Numerous Minnesota lakes are surrounded by intensively cultivated farmland. Fertilizer is often broadcast in the fall and plowed down; under some conditions fertilizer is broadcast in the spring and disked in on fields that were previously fall plowed, thus various conditions can prevail depending on management practices. From fertilized and unfertilized plots on a Barnes loam soil located in west-central Minnesota, nitrogen and phosphorus losses were determined in sediment and water components of surface runoff. Small fallow plots received uniform amounts of N and P and simulated rainfall was used to cause surface runoff. The amounts of N and P had different placement in the broadcast fertilizer. Deep incorporation of fertilizer by plowing down and subsequent disking caused N and P losses about equal to those in surface runoff from unfertilized plots. Highest nutrient losses occurred when fertilizer was broadcast on a disked surface. (Jones-Wisconsin)
W74-04096

EFFECT OF DIFFERENT SALINITIES ON GROWTH, REPRODUCTION, AMINO ACID SYNTHESIS, FAT AND SUGAR CONTENT IN ULVA FASCIATA DELILE,
Alexandria Univ. (Egypt); and Kuwait Univ.
A. F. Mohsen, A. H. Nasr, and A. M. Metwalli.
Botanica Marine, Vol 15, No 4, p 177-181, 1972. 7 fig, 4 tab, 18 ref.

Descriptors: *Salinity, *Plant growth, *Marine algae, *Reproduction, Amino acids, Synthesis, Lipids, Carbohydrates, Proteins, Temperature.
Identifiers: *Ulva fasciata.

To find the optimum salinities affecting the growth rate, reproductive phases, and maximum yield of amino acids, fats, and sugars, Ulva fasciata, containing high percentages of amino acids and proteins, was used. It represents a versatile alga adapted to varying degrees of salinity. Different grades of salinity ranging from 15-45 were prepared either by dilution or evaporation and back titration. Algal plants were washed with sterile sea water till all detritus was removed. Dense loads of epiphytes restricted to the stolons were peeled off. Plants were vigorously shaken with glass beads in sterile water to free them from contaminants, mainly bacteria. Growth rate of Ulva plants kept under 25C differed with varying salinity concentrations, the optimum being 25. Production of zoospores or gametes was traced in salinities between 20 and 35. The most favorable limit for free amino acid synthesis varied between salinities of 20-30, with the optimum at 25. Total fat content increased with increasing salinity up to 40. Above 40, total fat content decreased. Four types of sugars (glucose, fructose, sucrose, and raffinose) increased with salinity increase up to 35. (Jones-Wisconsin)
W74-04097

EFFECT OF DIFFERENT CARBON SOURCES ON GROWTH, REPRODUCTION, AMINO ACID SYNTHESIS, FAT AND SUGAR CONTENTS IN ULVA FASCIATA DELILE,
Alexandria Univ. (Egypt); and Kuwait Univ.
A. F. Mohsen, A. H. Nasr, and A. M. Metwalli.
Botanica Marina, Vol 15, No 4, p 182-185, 1972. 4 fig, 4 tab, 17 ref.

Descriptors: *Carbon, *Plant growth, *Reproduction, *Marine algae, Amino acids, Synthesis, Lipids, Carbohydrates, Carbon dioxide, Carbonates, Bicarbonates, Organic compounds, Metabolism, Photosynthesis.
Identifiers: *Ulva fasciata, Abu Qir(Egypt), Acetate, Pyruvate.

Carbon is derived by algae from carbon dioxide, carbonate, bicarbonate or organic compounds. It is quite probable that the metabolic routes for the assimilation of carbon compounds differ in different algal groups regarding qualitative and quantitative variations in amino acid synthesis. This investigation includes a study of the effect of acetate and pyruvate as carbon precursors and their effect on amino acid synthesis in Ulva fasciata plants. Fresh Ulva plants were collected from the Abu Qir locality at the Alexandria, Egypt shore and cultured. The effect of pyruvate and acetate on growth, amino acid synthesis, fat and sugar contents was assessed. Different carbon equivalent amounts of sodium pyruvate and sodium acetate were added to the standard culture medium. Effect of carbon sources on growth and reproduction show maximum increase when pyruvate was used followed by acetate. The data representing the amino acids both qualitatively and quantitatively together with different concentrations of sodium pyruvate and acetate are illustrated and amounts of total fats under different concentrations of pyruvate and acetate are indicated. Acetate rather than pyruvate is preferred for fat production. Pyruvate is preferential for carbohydrate metabolism rather than acetate. (Jones-Wisconsin)
W74-04098

EFFECT OF LOW OXYGEN CONCENTRATION ON SURVIVAL AND EMERGENCE OF AQUATIC INSECTS,
National Water Quality Lab., Duluth, Minn.
A. V. Nebeker.
Transactions of the American Fisheries Society, Vol 101, No 4, p 675-679, 1972. 3 fig, 3 tab, 11 ref.

Descriptors: *Oxygen, *Aquatic insects, Dissolved oxygen, Larvae, Mayflies, Stoneflies, Caddisflies, Midges, Mortality.
Identifiers: *Survival, *Emergence, Tanytarsus dissimilis, Ephemera simulans, Ephemera subvaria, Hexagenia limbata, Acroneuria lycorias, Hydropsyche betteni, Pteronarcys dorsata, Leptophebia nebulosa, Baetisca laurentina.

This study was designed to establish safe levels of dissolved oxygen for common species of aquatic insects known to be important as fish-food organisms. Both 96-hr tests and 30-day survival tests together with long-term tests (1 to 9 months) to determine effects of low oxygen on adult emergence were conducted. Safe concentrations of dissolved oxygen for survival and adult emergence of larvae of nine species of aquatic insects, including mayflies, stoneflies, caddisflies, and midges, ranged from 0.6 mg/l for the midge Tanytarsus dissimilis to slightly less than saturation for the emergence of Ephemera simulans (18.5C). All species tested were less tolerant of low oxygen concentrations for 30 days than for 96 hours (90% of E. simulans survived 4 mg/l for 96 hours but no adults emerged successfully). If long-term tests indicate that certain stages of the life cycles are more sensitive than others, then shorter tests covering the crucial life stage might accurately estimate the survival over greater lengths of time. Emergence tests with insects and full life cycle studies will give more accurate information of long-term response to oxygen stress. (Jones-Wisconsin)
W74-04100

A MEROMICTIC LAKE IN AUSTRALIA,
Monash Univ., Clayton (Australia). Dept. of Zoology.
B. V. Timms.
Limnology and Oceanography, Vol 17, No 6, p 918-922, 1972. 1 fig, 1 tab, 11 ref.

Descriptors: *Saline lakes, *Meromixis, *Australia, Salinity, Hydrogen ion concentration, Oxygen, Hydrogen sulfide, Stratification.
Identifiers: *West Basin Lake(Australia).

A small saline maar near Colac, Victoria, Australia has a salinity differential between the mixolimnion and monimolimnion of 40%. There are also marked differences in pH, oxygen, and hydrogen sulfide concentrations in the two zones. The lake lies in basalt which is covered by a thin layer of basaltic tuff. Monthly, and at times fornightly, observations were made from November 1970 to August 1971 at a station in the deepest part of the lake. The mixolimnion stratified during summer and as it cooled in autumn the lake became mesothermal and finally by winter the temperature profile was inverted. Available evidence favors an ectogenic origin which was probably quite recent. Meromixis would be established by lake shrinkage and water concentration during a prolonged drought followed by flooding with freshwater during abnormally heavy rains. For meromixis to occur, flooding would have to be fairly rapid, and protection from the wind would be essential. In summary, the origin of meromixis is certainly recent, and in all probability occurred in mid-1968. Its present low stability indicates imminent destruction. (Jones-Wisconsin)
W74-04101

THE EXCRETION OF ORGANIC NITROGEN BY MARINE ALGAE IN BATCH AND CONTINUOUS CULTURE,
Commonwealth Scientific and Industrial Research Organization, Cronulla (Australia). Div. of Fisheries and Oceanography; and Queen's Univ., Kingston (Ontario). Dept. of Biology.
B. S. Newell, G. Dalpont, and B. R. Grant.
Canadian Journal of Botany, Vol 50, No 12, p 2605-2611,1972. 4 fig, 1 tab, 23 ref.

Descriptors: *Organic compounds, *Nitrogen, *Marine algae, *Cultures, Peptides, Growth rates, Chlorophyta, Diatoms.
Identifiers: *Nitrogen excretion, Polypeptide, Dunaliella, Chroomonas, Phaedactylum tricornutum.

Results are presented which indicate that nitrogen compounds are excreted in significant amounts by a number of algal species belonging to divisions other than blue-green algae. The excretory products appear to have properties of low molecular weight peptide. On the basis of experiments with continuous cultures, it is concluded that this excretion of nitrogenous material is a continuous process, but there is an increase in production when cells are switched from logarithmic growth to stationary growth. Under these conditions there is a decline in average nitrogen content per cell. Production of this material was not increased by stress, such as growth rate, light, carbon dioxide, or pH changes, but only when the continuous cultures stagnated. Low rates of excretion of nitrogenous materials takes place in healthy cells growing exponentially. At the close of exponential growth and onset of senescence, excretion of nitrogen rises appreciably. It is unlikely that the levels of organic nitrogen excretion measured in these experiments would lead to increases under natural conditions where bacterial numbers would be much higher than those in these cultures. Presumably the excreted nitrogenous material could be important as a nitrogen source for such organisms. (Jones-Wisconsin)
W74-04102

A PROGRAMME FOR STUDIES OF THE RECOVERY OF POLLUTED LAKES. THE EFFECT OF CHEMICAL SEWAGE TREATMENT AND DIVERSION OF SEWAGE,
National Swedish Environment Protection Board, Stockholm.
C. Forsberg, B. Hawerman, and L. Ulmgren.
May 1972. 10 p, 2 fig, 1 tab, 6 ref.

Descriptors: *Lakes, *Reclamation, Sewage effluents, Chemical precipitation, Diversion, Water pollution control, Eutrophication.
Identifiers: *Lake Norrviken(Sweden), Sewage diversion.

A Swedish program is planned to elucidate effects on lakes of effluents from chemical sewage treatment plants. Conditions in many different types of recipient lakes will be analyzed. Course of recovery of several polluted lakes from which sewage effluent has been completely diverted will be studied, the efficiency of the treatment plants continuously monitored, and the nutrient loadings of lakes calculated. Preliminary selected of lakes and treatment plants to be studied are presented and research programs, for which 700,000 Swedish krona per year have been allocated, are outlined. Today in Sweden there are about 100 chemical sewage treatment plants serving 14% of the urban population. The amount of phosphorus which is presently released via sewage from rural as well as urban areas can be estimated at approximately 7000 metric tons per year. To what extent and how rapidly a polluted lake will recover when its nutrient input is lowered depends upon many factors, for example, lake size and form, length of time the water remains in the lake basin, chemical and biological character of the water, and climatic conditions. Previous nutrient loadings as well as the degree of sewage effluent diversion are also important. (Jones-Wisconsin)
W74-04105

PHOSPHATES AND THE ENVIRONMENT,
Massachusetts Dept. of Public Health, Boston. Div. of Environmental Health.
J. C. Collins.
New England Water Works Association, Vol 86, No 3, p 209-212, 1972.

Descriptors: *Phosphates, *Detergents, New England, Eutrophication, Sewage treatment.

Effective control of eutrophication will require advanced treatment facilities for all sewage and waste waters, especially municipal, industrial, and agricultural wastes. Such facilities would minimize all important nutrients, including phosphates. Abruptly halting or radically curtailing the use of washing compounds containing phosphates would not stop eutrophication, and some proposed substitutes might introduce very serious health hazards. Reasonable limitations on the phosphate content of laundry and cleaning compounds now under consideration in Massachusetts would help control one source of phosphate in the environment, and be a useful tool in helping control eutrophication in some waters. Such reasonable limitations would permit continued sale and use of effective washing compounds, while protecting the environment against needlessly large amounts of this plant nutrient. Overemphasis on the phosphate limitation would be unfortunate because it would divert public attention and support from the basic need for constructing effective sewage treatment facilities. Attaining high water supply standards for New England water will require a balanced program of public and private expenditures for pollution control facilities and an adequate environmental surveillance effort by public health and other governmental agencies. (Jones-Wisconsin)
W74-04107

DILUTIONAL PUMPING AT SNAKE LAKE, WISCONSIN,
Wisconsin Univ., Madison; and Wisconsin Dept. of Natural Resources, Madison.
S. M. Born, T. L. Wirth, J. O. Peterson, J. P. Wall, and D. A. Stephenson.
Wisconsin Dept. of Natural Resources Technical Bulletin No 66, 1973. 32 p, 24 fig, 9 tab, 39 ref.

Descriptors: *Rehabilitation, *Lakes, *Pumping, Nutrient removal, Wisconsin, Water quality, Sediments, Groundwater, Phosphorus, Nitrogen, Chlorides, Eutrophication, Costs, Nutrients.
Identifiers: *Lake renewal, *Lake flushing, *Snake Lake(Wis).

Among the various ways to renovate overfertile lakes is the technique of dilution or flushing. The degree of success of this renewal technology is largely a function of nutrient mass transport processes. Nutrient exclusion/dilutional pumping of small, northern Wisconsin, eutrophic Snake Lake, where nutrient inflows via direct discharge of municipal wastes had been stopped for several years with little improvement in water quality, is reported. The local geology and hydrology suggested an innovative flushing method in which nutrient-rich lake water was pumped from the lake to a nearby land disposal area, allowing dilution by influent ground waters. Soil, hydrogeologic (particularly lake-groundwater relationship), and bottom sediment nutrient transfer studies were also conducted in conjunction with the lake renewal activity. Although dilutional pumping of the lake has not 'renewed' it and severe dissolved oxygen depletion problems during two winters following pumping continue to prevent the establishment of a sport fishery, phosphorus concentrations were diluted, nitrogen and chloride levels, conductance, and color were reduced, and nuisance blooms of duckweed eliminated. Bottom sediments appear to be the major source of regenerated nutrients. (Jones-Wisconsin)
W74-04108

CHEMICAL CHANGES IN THE WATER AND ACCUMULATION STRATUM OF SOILS IN PONDS FERTILIZED WITH BEET-SUGAR FACTORY WASTES,
S. Lewkowicz.
Acta Hydrobiologica, Vol 15, No 1, p 1-49, 1973. 23 fig, 12 tab, 91 ref.

Descriptors: *Sugar beets, *Waste treatment, *Self-purification, *Sewage lagoons, *Food processing industry, Fish harvest, Primary productivity, Organic matter, Physicochemical properties, Filtration, Oxidation, Degradation(Decomposition), Carp, Turbidity, Lime, Industrial wastes.
Identifiers: *Fish ponds, *Poland.

The self-purification process of beet-sugar factory wastes in fish ponds was studied including waste mineralization, transformation, and dynamics of mineral components in the water, phytoplankton primary production and oxygen conditions, waste influence on physicochemical properties of pond sediments, and effects in the second year. The four productive ponds studied were built on silt soils and supplied with water from River Bajerka. About 1 km from the factory, they were flooded with factory wastes. These waste waters, originating from various production departments, were not homogeneous and were mixed with domestic sewage. During the first two months, wastes came directly from the factory, but in February were taken from filtration fields. The mixed sewage consisted of various recirculated waters and wastes after treatment in the Nolte biological purification plant. The filtration fields influence the physico-chemical properties of wastes thus treated. Mineralization time of wastes lasted 3-6 months depending on concentration or dilution of their organic matter. Complete disintegration of organic matter introduced with the sewage was established, as no organic matter accumulation was found in the pond soils at the end of the season. Fish yield was several times higher in ponds fertilized with sugar factory wastes than in control ponds. (Jones-Wisconsin)
W74-04110

THE APPLICATION OF FUNDAMENTAL LIMNOLOGICAL RESEARCH IN WATER SUPPLY SYSTEM DESIGN AND MANAGEMENT,
Metropolitan Water Board, West Molesey (England). Queen Elizabeth II Reservoir.
J. A. Steel.
Symposia of the Zoological Society of London, No 29, p 41-67, 1972. 8 fig, 38 ref.

Descriptors: *Water treatment, *Potable water, *Water works, Design, Management, Water purification, Impoundments, Destratification, Algal control, Oxygenation, Phytoplankton, Biomass, Anaerobic conditions, Herbivores, Zooplankton, Daphnia, Mixing.

Those potable water treatment systems which include an impoundment stage, and are attempting to purify river water subjected to considerable fluctuating nutrient and bacterial enrichment from sewage and/or land drainage are considered. A generalized scheme of usual treatment layout units is given indicating 'waste' products. In water bodies which thermally stratify with limited hypolimnetic volumes, deoxygenation of that hypolimnion is an eventual outcome of the suppression, at or near the thermocline, of effective transport between deep oxygen sinks and superficial sources. It would be necessary to prevent stratification of the basin. Systems are now available which can, economically, supply energy at many times the rate of basins considered. These energetic capabilities can alter the impounded water's characteristics so as to affect the biota. A 'limiting' circulation depth for 'spring' diatoms is, in the waters considered, suggested to be almost 30 m. Some adverse effects of turbulence are indicated. Grazing by herbivorous zooplankton is suggested to be an important factor in reducing summer phytoplankton crops, thus husbandry of zooplankton might be desirable. A degree of 'negative feedback' might be incorporated in the system. Such design and/or management would allow some system optimization. (Jones-Wisconsin)
W74-04111

FORMATION OF CARBON MONOXIDE AND BILE PIGMENT IN RED AND BLUE-GREEN ALGAE,
Boston Univ., Mass. Dept. of Biochemistry.
R. F. Troxler, and J. M. Dokos.
Plant Physiology, Vol 51, No 1, p 72-75, 1973. 1 fig, 2 tab, 34 ref. NSF GB 20924.

Descriptors: *Biochemistry, *Rhodophyta, *Cyanophyta, *Carbon, *Pigments, Algae, Mammals, Cytological studies.
Identifiers: *Carbon monoxide, *Bile pigment, Linear tetrapyrroles, Phycocyanobilin, Porphyridium cruentum, Phycocyanin, Anacystis nidulans, Plectonema boryanum, Nostoc muscorum, Synechococcus cedrorum, Phormidium luridum, Cyanidium caldarium.

Some quantitative and kinetic parameters of carbon monoxide and bile pigment formation in five blue-green algae species and in the red alga, Porphyridium cruentum are described. Algal bile pigment was measured. Phycoerythrin was purified from sonicated cells. Carbon monoxide evolved by the blue-green algal cells was quantitated by displacing the contents of the gas reservoir through a Beckman 315A infrared analyzer. Results show that carbon monoxide is a by-product of bile pigment formation in algae tested. The kinetics of carbon monoxide and phycocyanobilin formation and the 1:1 molar ratio observed

between these compounds suggests that they arose from a common intracellular intermediate. The blue-green algae synthesized carbon monoxide and phycocyanobilin in equimolar quantities at identical rates. Porphyridium cruentum incorporated delta-aminolevulinic acid-5-C14 into phycoerythrobilin and carbon monoxide. The ratio of the specific radioactivity of phycoerythrobilin to that of carbon monoxide, and the kinetics and stoichiometry of phycocyanobilin and carbon monoxide formation suggest that linear tetrapyrroles in plants are derived by the porphyrin pathway via the intermediate formation of heme. The similarity between bile pigment production in algae and in mammalian systems is discussed. (Jones-Wisconsin)
W74-04112

AERATION AT WEIRS.
Water Pollution Research Lab., Stevenage (England).
Department of the Environment (England), Notes on Water Pollution, No 61, 1973. 4 p, 3 fig, 10 ref.

Descriptors: *Aeration, *Weirs, *Dissolved oxygen, Hydraulic structures, Water pollution control.
Identifiers: England.

Whether modification of existing weirs and other hydraulic structures as a method of oxygenation of free-flowing rivers would be worthwhile is considered. If, as a result of photosynthesis, the water arriving at a weir is super-saturated the gas exchange at the weir results in a oxygen loss from the system. Factors affecting the magnitude of the oxygen deficit ratio are water temperature, depth of receiving water, weir height, water quality, type of weir structure, and depth of water over the weir. The normal weir is only one of the wide variety of structures associated with a head loss in rivers. Some are more, and others less, effective aerators than the normal weir. Use of suitable structures can greatly enhance the distribution of dissolved oxygen in a polluted river where there are head losses at obstructions. Predictions may be made of the oxygen exchange likely to occur with falls up to 3 m. A simple weir can supply much oxygen to a polluted river, and more complex structures can provide further improvement, but where there are problems arising from algal photosynthesis it may be advisable to minimize the oxygen exchange at times of supersaturation. (Jones-Wisconsin)
W74-04113

THE MOLLUSK FAUNA OF THE BOLSHOI KARABULAK OXBOW LAKE (VOLGA DELTA), (IN RUSSIAN),
For primary bibliographic entry see Field 2H.
W74-04165

ENVIRONMENTAL SURVEILLANCE FOR RADIOACTIVITY IN THE VICINITY OF THE CRYSTAL RIVER NUCLEAR POWER PLANT: AN ECOLOGICAL APPROACH,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 5B.
W74-04173

INTERIM ENVIRONMENTAL MONITORING REPORT: JANUARY-JUNE 1973,
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 5A.
W74-04174

ENVIRONMENTAL RADIOACTIVITY - ISPRA 1971,
European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.
For primary bibliographic entry see Field 5B.
W74-04176

DOSE ESTIMATIONS FOR THE HYPOTHETICAL USE OF NUCLEARLY STIMULATED NATURAL GAS IN THE CHEROKEE STEAM ELECTRIC STATION, DENVER, COLORADO,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-04177

ACTIVE PHASE OF ASSIMILATION OF PLUTONIUM-239 BY THE MARINE ALGAE ASCOPHYLLUM NODOSUM,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. S. Zlobin.
Available from NTIS, Springfield, Va., as Rept. No. AEC-tr-7418. $7.60 per copy, $1.45 microfiche. In: AEC-Translation-7418, p 207-217, 4 fig, 4 tab, 19 ref. Trans. from Trudy Pniipimrkho, Vol 29, 1971.

Descriptors: *Phaeophyta, Marine algae, *Radioactivity effects, *Radioisotopes, *Respiration, Plant physiology, *Inhibitors, Photosynthesis, Absorption, Membranes, Cytological studies, Water pollution, Radioisotopes.
Identifiers: *Plutonium-239, Sodium cyanide, Ammonium chloride, Cadmium chloride, *Ascophyllum nodosum.

A study was made of the problem of accumulation of Pu-239 by the brown alga Ascophyllum nodosum during suppression of cell respiration. As the inhibitors sodium cyanide in a concentration of 1.10 to the minus 4th power M, ammonium chloride 10 mM and 100 mM and cadmium chloride 2mM were used. They cause a decrease in the Pu-239 accumulation factors in dependence on the substrate on which they act. A study was made of the mechanism of this phenomenon and it was possible to establish the dependence of the intensity of cell respiration and the accumulation factor. Hypotheses are presented on the means and methods by which Pu-239 in a colloidal state penetrates through the cell membrane. (Houser-ORNL)
W74-04178

PHOTOSYNTHESIS AND THE MECHANISM OF THE ACTION OF CYANIDE ON CELL RESPIRATION AND PLUTONIUM-239 ACCUMULATION BY MARINE ALGAE,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. S. Zlobin, and M. F. Perlyuk.
Available from NTIS, Springfield, Va., as Rept. No. AEC-tr-7418, $7.60 per copy, $1.45 microfiche. In: AEC-Translation-7418, p 195-206, 4 fig, 3 tab, 10 ref. Trans. from Trudy Pniipimrkho, Vol 29, 1971.

Descriptors: Aquatic algae, *Phaeophyta, Marine algae, Water pollution, Radioisotopes, *Radioactivity effects, Algal toxins, Algal poisoning, Inhibitors, Chemical reactions, *Respiration, Plant physiology, *Photosynthesis.
Identifiers: *Plutonium-239, Ultraphagocytosis, *Cyanide, *Ascophyllum nodosum.

Cultivation of the brown alga Ascophyllum nodosum in the control (addition of Pu-239 in a concentration n.10 to the minus 6th power microcurie) and experimental aquaria (plutonium in the same concentration and cyanide in a quantity 1.10 to the minus 4th power M) revealed a stable suppression of accumulation of an alpha-emitter by algae in the presence of an inhibitor. As a result of chromatographic separation of amino acids in plant hydrolysates the greatest activity was registered in serine-glycine (34.66%), histidine (31.94%) and alpha-alanine (10.49%). Quantitatively these acids also predominate. In the investigated samples it was established by the electrophoretic method that the tag is incorporated into hypoxanthine and adenosine monophosphoric acid. The introduction of the cell respiration inhibitor cyanide into the energy system of algae caused a response reaction in the form of a decrease in plutonium accumulation by plant cells. It is postulated that assimilation of colloid particles of plutonium occurs as a result of ultraphagocytosis. (Houser-ORNL)
W74-04179

RADIATION REACTION OF THE ADENOHYPOPHYSIS-GONADS SYSTEM IN COLD-BLOODED ANIMALS,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
L. A. Kashchenko.
Available from NTIS, Springfield, Va., as Rept. No. AEC-tr-7418. $7.60 per copy, $1.45 microfiche. In: AEC-Translation-7418, p 166-194, 2 fig, 6 tab, 20 ref. Trans. from Trudy Pniipimrkho, Vol 29, 1971.

Descriptors: Aquatic population, Animal population, Radioactivity, *Water pollution effects, *Frogs, *Radioactivity effects, Water pollution sources, Nuclear wastes, *Gonads, Biology, *Reproduction, Chromosomes, Cytological studies.
Identifiers: *Adenohypophysis.

In experiments with local and general irradiation a study was made of the interrelated radiation reaction of the adenohypophysis and gonads (ovaries and testes) in the grass frog. Not essentially differing from the reaction of these glands in higher animals, the radiation reaction of the adenohypophysis and gonads in the frog is characterized by some specific features associated with the anatomical-physiological peculiarities of the species. These include poor reversibility of radiation damage to the testes, high morphological radioresistance of structural elements of the ovary, and high radio-tolerance and repairability of the adenohypophysis. In the example of a frog, the most important aspects have been clarified of the reaction in a system of functionally interrelated organs having universal importance: as a result of irradiation there is an impairment or a complete disruption of the functional relationship between the glands. This brings about the development of two processes which mutually supplement one another: damage to the mechanisms of the synthesis and release of hormones and damage to mechanisms responding to endogenous (hormonal) stimulators. Radiation damage develops as a process leading to system disintegration. With respect to its physiological aftereffects this process is comparable to surgical removal of the glands. (Houser-ORNL)
W74-04180

EFFECT OF X-IRRADIATION ON THE INCORPORATION OF GLYCINE-C14 IN THE TISSUE OF ATLANTIC SALMON LARVAE,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. L. Kas'yanov, and N. A. Lukina.
Available from NTIS, Springfield, Va., as Rept. No. AEC-TR-7418. $7.60 per copy, $1.45 microfiche. In: AEC-Translation-7418, p 134-141, 3 fig, 15 ref. Trans. from Trudy Pniipimrkho, Vol 29, 1971.

Descriptors: *Atlantic salmon, *Larvae, *X-rays, Growth stages, Absorption, Measurement, Fish, Animal physiology, Cytological studies, Control, *Radioactivity effects.
Identifiers: *Liver(Fish), *Skeletal muscle(Fish).

Atlantic salmon (Salmo salar L.) larvae at an age of one day after hatching were irradiated by X-rays in a dose of 350 R. One, four and eight days after irradiation the larvae were placed for 16

hours in an aqueous solution of glycine-C14 with a given concentration. The degree of incorporation was judged from the number of grains of reduced silver on radioautographs of sections of the liver and skeletal muscles (over an area of 100 x 100 u). The incorporation of glycine-C14 into the tissues of irradiated larvae was greater than its incorporation into these same tissues of control larvae at all research times (the difference was statistically significant). The incorporation of glycine-C14 into the liver for an identical area of section is greater in comparison with incorporation into the skeletal muscles both in the control and in the experimental samples. (Houser-ORNL)
W74-04181

NATURAL RADIATION LOADS ON THE EGGS OF MARINE AND FRESH WATER ORGANISMS,
Polyarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. N. Podymakhin.
Available from NTIS, Springfield, Va., as Rept. No. AEC-tr-7418. $7.60 per copy, $1.45 microfiche. In: AEC-Translation-7418, p 142-156, 1 fig, 4 tab, 21 ref. Trans. from Trudy Pniipimrkho, Vol 29, 1971.

Descriptors: *Atlantic salmon, *Radioactivity, Water pollution, *Water pollution effects, *Fish eggs, Embryonic growth stages, Cytological studies, Environmental control, Productivity, Radioisotopes, Carbon, Radium radioisotopes, Uranium radioisotopes.
Identifiers: Thorium.

An approximate method is proposed for computing the energy of beta radiation absorbed by eggs under different natural conditions with allowance for the geometric peculiarities of the object. Using the derived expressions, the absolute values of the radiation loads are computed from the natural radioactive isotopes present in sea and fresh water. The derived formulas can also be used for computing the doses from artificial radionuclides. (Houser-ORNL)
W74-04182

EFFECT OF INCORPORATED RADIONUCLIDES ON THE CHROMOSOMAL APPARATUS OF MARINE FISH,
Polarnyi Nauchno-Issledovatelskii i Proektnyi Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Murmansk (USSR).
V. G. Tsytsugina.
Available from NTIS, Springfield, Va., as Report No. AEC-tr-7418. $7.60 per copy, $1.45 microfiche. In: AEC-Translation-7418, p 157-165, 1 fig, 3 tab, 20 ref. Trans. from Trudy Pniipimrkho, Vol 29, 1971.

Descriptors: *Radioactivity, Water pollution, *Water pollution effects, *Marine fish, *Strontium, Toxicity, Embryonic growth stages, Larvae, *Chromosomes, Cytological studies, Food chains, Public health, *Fish eggs.
Identifiers: *Yttrium, Chromosomal abberations.

The fertilized eggs of Scorpaena porcus L. and Rhombus maeoticus Pall. were incubated in solutions of radionuclides strontium-90 + yttrium-90, strontium-89 and yttrium-91 in the range of concentrations 10 to the minus 11th power - 10 to the minus 5th power curie/liter. In the gastrula and one-day prolarva stages the material was fixed and pressed acetoorsein specimens were prepared. Anaphases and telophases with chromosomal impairments were detected. A high radiosensitivity of the embryos of sea fish was noted: a reliable damaging effect was already noted in concentrations of radionuclides 10 to the minus 10th power curie/liter to 10 to the minus 5th power curie/liter. There was a close correlation between the degree of chromosomal damage and the gravity of radiation damage to prolarvae. (Houser-ORNL)
W74-04183

HEALTH EFFECTS OF ELECTRICITY GENERATION FROM COAL, OIL, AND NUCLEAR FUEL,
Carnegie-Mellon Univ., Pittsburgh, Pa. Graduate School of Industrial Administration.
L. B. Lave, and L. C. Freeburg.
Available from Supt. of Doc., Gov. Printing Office, Washington, D.C., $1.85 per copy. Nuclear Safety, Vol 14, No 5, p 409-428, Sept-Oct 1973. 2 tab, 123 ref.

Descriptors: *Electric power, Electric powerplants, Effluents, Air pollution, Water pollution, *Air pollution effects, *Water pollution effects, *Public health, *Coals, *Oil, Uranium radioisotopes, Radioactivity, Cost-benefit theory, Comparative benefits, Comparative costs, Comparative productivity.
Identifiers: *Nuclear fuels.

Occupational- and public-health effects of generating electricity from coal, uranium, and oil are compared, with particular attention given to accident and chronic-disease rates for fuel extraction and airborne emissions from power and reprocessing plants. It is concluded that uranium offers less of a health hazard as fuel than coal. The analysis is based on current operating practice; however, advances in technology can be expected to reduce both the occupational and public-health risks from these fuels. (Houser-ORNL)
W74-04184

UPTAKE AND TRANSLOCATION OF SR BY ZEA MAYS,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
R. Handley, and K. L. Babcock.
Radiation Botany, Vol 13, No 5, p 273-281, Nov 1973. 3 fig, 4 tab, 20 ref.

Descriptors: *Corn(Field), *Radioactivity, *Radioisotopes, *Strontium, *Cesium, *Absorption, *Plant growth, Plant morphology, Resistance, Root system, Attractants, Metabolism, Ion exchange, Membrane processes, Osmosis, Reverse osmosis, Cytological studies, Potassium, Calcium.

The uptake of Sr by maize-root segments representing the whole root system is strongly temperature dependent but a large non-metabolic component apparently involving adsorption within the cell membranes is indicated. About 60 per cent of the Sr taken up under conditions permitting metabolism is resistant to elution. K in the ambient solution at a concentration amounting to 20 per cent of the Sr concentration essentially abolishes metabolic uptake. Non-metabolic Sr uptake is little affected by this K concentration. The inhibitory effect of Ca on Sr uptake is less than that of K and largely exerted on the non-metabolic phase. This inhibitory effect is countered to some degree by the ability of Ca to hinder the entry of Sr into the xylem and so its loss via the cut ends of the root segments. In whole-plant experiments K depressed root concentrations of Sr more than shoot concentrations indicating that the inhibition is exerted mainly at the tonoplasts of cortical cells. Ca had a smaller effect than K which was mainly evident in greater root retention of Sr. (Houser-ORNL)
W74-04187

IMPACT OF A POWER PLANT ON A SUBTROPICAL ESTUARINE ENVIRONMENT,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
A. Thorhaug, D. Segar, and M. A. Roessler.
Marine Pollution Bulletin, Vol 4, No 11, p 166-169, Nov 1973. 2 fig, 2 tab, 15 ref.

Descriptors: *Nuclear powerplants, *Fossil fuels, *Electric power, Water pollution effects, Water pollution sources, Effluents, Water releases, *Cooling water, Water circulation, Meteorology, Mineralogy, Carbonates, Sediments, Clays, *Estuarine environment, Estuaries, Gulfs, Sounds, Bays, Atlantic Ocean, *Florida, *Thermal pollution.
Identifiers: Barnes Sound, Card Sound, *Biscayne Bay(Fla).

The development of electricity generating stations around Biscayne Bay, Florida has resulted in a considerable discharge of cooling water into this subtropical sea. The impact of this on the biology of the area has been studied for the last four years by a team of scientists; their general conclusions are summarized. Detail is given for the water circulation pattern for the area, mineral concentration of the water, vegetation studies, and the impact on animals. (Houser-ORNL)
W74-04189

FLUX OF CE-141 THROUGH A EUPHAUSIID CRUSTACEAN,
International Lab. of Marine Radioactivity, Monte Carlo (Monaco).
S. W. Fowler, M. Heyraud, L. F. Small, and G. Benayoun.
Marine Biology, Vol 21, No 4, p 317-325, Aug 1973. 6 fig, 2 tab, 24 ref.

Descriptors: Marine animals, Environmental effects, *Water pollution effects, Radioactivity, *Radioactivity effects, Radioisotopes, Absorption, Aquatic populations, Equilibrium, Productivity, *Crustaceans, *Path of pollutants.
Identifiers: *Cerium.

The role of the Mediterranean euphausiid Meganyctiphanes norvegica in the cycling of radiocerium (Ce-141) was examined. When uptake of Ce-141 occurs directly from the water, a 'dynamic' population equilibrium is reached at a concentration factor of about 250. Molting was responsible for up to 99% loss of total body burden at first molt, and about 45% of the remaining activity at second molt, thus denying true longterm equilibrium to individual animals. Fecal pellets did not contain measureable Ce-141 activity when the euphausiids accumulated the isotope from water, thus proving that surface adsorption was the key accumulating process from water. When radiocerium was taken in through ingestion of labelled Artemia, about 99% of the body burden was voided as fecal pellets. Excretion by this route was accelerated when euphausiids were fed non-radioactive Artemia during loss phase. Radioactive counts of the pellets confirmed that all ingested Ce-141 was lost through defecation. When Ce-141 was ingested as labelled phytoplankton, a substantial fraction of the total body burden occurred in the molts, which indicated that the phytoplankton loss Ce-141 to the water and the radiocativity was subsequently absorbed to outer surfaces of the euphausiids. (Houser-ORNL)
W74-04191

PRIMARY PRODUCTIVITY IN THE CRAPINA-JIJILA LAKE-COMPLEX (DANUBE FLOODED AREA) DURING SEVERE FLOODING,
Bucharest Univ. (Rumania). Faculty of Biology.
L. Gavrila, I. Chiosila, and A. Schneider.
Arch Hydrobiol Suppl. Vol 44, No 1, p 10-23, 1972. English summary.
Identifiers: Danube area, Flooding, Lakes, *Phytoplankton, *Primary productivity, *Romania(Crapina-Jijila Lake Complex).

The work involved quantitative and qualitative studies of phytoplankton, together with measurement of primary productivity and of physical and chemical conditions. Investigations were made in 2 different ecological systems: Jijila, which is intensively cultivated and Crapina which is not. The

balance of primary plankton production had positive values in both systems. In Lake Jijila the primary production was higher and the bio-mass of phytoplankton was greater. This was attributed to the more intense cultivation.--Copyright 1973, Biological Abstracts, Inc.
W74-04194

INCREASING THE PROCESSING RATE OF PARTICULATE ORGANIC MATTER IN STREAMS,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 5B.
W74-04202

EFFECTS OF TEMPERATURE CHANGE ON IRRIGATION RATE IN ARENICOLA MARINA (L.),
Hull Univ. (England). Dept. of Zoology.
M. K. Seymour.
Comparative Biochemistry and Physiology, Vol 43A, No 3, p 553-564, 1972. 6 fig, 29 ref.

Descriptors: *Temperature, *Water temperature, *Animal behavior, *Animal pathology, Analytical techniques, Laboratory studies, Respiration, Bioassay, Environmental effects, Laboratory animals, Marine animals, Metabolism, Environmental effects, *Worms, Invertebrates.
Identifiers: *Arenicola marina(L.).

The effects of slow and rapid temperature fluctuations on the rate of burrow irrigation in Arenicola marina (L.) have been studied using pressure and impedance recording techniques. With slow temperature change (2 degrees C/hr) irrigation rate rises very slowly up to 10C, faster between 10 and 14C, more slowly up to 18C and drops sharply above 18C. The total number of irrigation waves, frequency of exposure of the gills and substantially the volume of water pumped vary as does the rate/temperature curve. Despite the characteristic rate change with gradual temperature change there is a compensatory response to quickly changed temperature which shows marked overshoot and oscillation. Removal of the ventral nerve cord in a segment stops all irrigation movement in that segment. After nerve cord section in the mid trunk, the rate of each half of the trunk is dictated independently by the environmental temperature of that half; it is probably the irrigation pacemaker mechanism in the cord which responds to a change in temperature by a change in rate. (Oleszkiewicz-Vanderbilt)
W74-04225

THE OXYGEN CONSUMPTION OF CHIRONOMID LARVAE FROM LOCH LEVEN IN RELATION TO TEMPERATURE,
Stirling Univ. (Scotland). Dept. of Biology.
A. McFarlane, and D. S. McLusky.
Comparative Biochemistry and Physiology, Vol 43A, No 4, p 991-1001, 1972. 6 fig, 7 tab, 14 ref.

Descriptors: *Oxygen requirements, *Temperature, *Larvae, *Diptera, Biochemistry, Insects, Oxygen, Thermal pollution, Animal behavior, Environmental effects, Bioindicators, Water temperature, Europe, Sediments, Dredging, Lakes.
Identifiers: Acclimation, *Scotland(Lock Leven), *Chiromid larvae.

The oxygen consumption of four genera (Stictochironomus, Glyptotendipes, Polypedilum and Chironomus) of Chironomid larvae from Loch Leven has been measured. Measurements have been made at 5, 10 and 15C, on animals both acclimated and non-acclimated to these temperatures. A marked effect of temperature on oxygen consumption has been noted with oxygen consumption increasing with higher temperature but no acclimation effect has been demonstrated. (Oleszkiewicz-Vanderbilt)
W74-04226

RESPIRATORY AND CIRCULATORY RESPONSES IN A HEMOGLOBIN-FREE FISH, CHAENOCEPHALUS ACERATUS, TO CHANGES IN TEMPERATURE AND OXYGEN TENSION,
Scripps Institution of Oceanography, La Jolla, Calif. Physiological Research Lab.
E. A. Hemmingsen, and E. L. Douglas.
Comparative Biochemistry and Physiology, Vol 43A, No 4, p 1031-1043. 1972, 6 fig, 44 ref.

Descriptors: *Fish behavior, Temperature, *Respiration, Circulation, Oxygen, *Oxygen requirements, Environmental effects, Water pollution effects, Animal physiology, Thermal stress, Thermal pollution, *Water temperature, Stress.
Identifiers: *Chaenocephalus aceratus, Hypoxia, *Blood pressure.

Dorsal aortic and caudal venous blood pressures, pO2, pCO2, pH, and lactic acid were monitored in unrestrained specimens of Chaenocephalus acreatus. The aortic blood pressure was exceptionally low (about 12/8 mm Hg) as was the blood lactic acid concentration (about 3 mg/100 ml at rest). The other parameters were similiar to those of other fish. The effects of hypoxia were also examined. The oxygen consumption increased gradually from 1 to 4 degrees C, but then remained almost constant up to 10 C. The critical water pO2 (40-45 torr) was little affected by increased temperatures. The viscosity of the blood was very low (about 2.91 centistokes at 0C); this aids the increased circulation in the chaenichthyids. (Oleszkiewicz-Vanderbilt)
W74-04227

THE EFFECT OF THE BRUNNER ISLAND STEAM ELECTRIC STATION'S CONDENSER DISCHARGE WATER ON THE AQUATIC LIFE IN THE SUSQUEHANNA RIVER,
Pennsylvania Power and Light Co., Allentown.
H. F. Hatfield, M. G. Pfeiffer, and C. B. Wurtz.
American Society of Mechanical Engineers, Publication Number 66-WA/PWR-10, 1966. 11 p, 6 fig, 2 tab.

Descriptors: *Heated water, Growth, Mortality, *Condensers, *Diatoms, *Bioindicators, Electric power production, Thermal power-plants, Effluents, Aquatic environment, Environmental effects, Aquatic animals, Analytical techniques, Aquatic micro-organisms, Temperature, Microscopy, *Pennsylvania, Algiciders, Disinfection, Slime, *Thermal pollution, Water pollution effects.
Identifiers: *Susquehanna River.

A study undertaken to determine the effects of an electric power plant's warm water discharges on the aquatic environment is presented. A 300 mw facility located at Brunner Island on the Susquehanna River is using some 240 cu ft/sec of river water for condenser cooling. The river has an average annual flow of 34,000 cu ft/sec with a minimum flow of 1700 cu ft/sec. Diatoms were used as indicators in this study. Microscope slides were placed in different locations to collect organisms and were changed every two weeks. Two thousand slides were exposed and examined. Graphical analysis indicated a preponderance of diatoms falling between 70F and 90F. Diatoms in the cooling water were killed by heat shock during most of the year. However, when the inlet water temperature was over 55F and outlet temperature was below 93F diatom growth in the discharge canal was greater than at any other point in the river. Chlorine concentrations did not seem to affect diatoms. Variables have been identified for predicting diatom numbers under the conditions at the Brunner Island plant site. (Jerome-Vanderbilt)
W74-04228

A TECHNIQUE FOR SIMULTANEOUS ECHO LOCATION OF FISH AND THERMAL PLUME MAPPING,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 5B.
W74-04229

TEMPERATURE AND PHYTOPLANKTON GROWTH IN THE SEA,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
R. W. Eppley.
Fishery Bulletin, Vol 70, No 4, p 1063-1085, 1972, 9 fig, 6 tab, 100 ref.

Descriptors: *Water temperature, *Phytoplankton, *Marine microorganisms, *Growth rates, Aquatic productivity, Photosynthesis, Assimilation, Plankton, Oceans, Water temperature, Chlorophyll, Marine plants, Aquatic environment, Water pollution, Chlorophyll, Euphotic zone, *Sea water.
Identifiers: *Carbon-chlorophyll ratio.

The variation in growth rate with temperature of unicellular algae suggests that an equation can be written to desceibe the maximum expected growth rate for temperatures less than 40C. Measured rates of phytoplankton growth in the sea and in lakes are reviewed and compared with maximum expected rates. The assimilation number (i.e., rate of photosynthetic carbon assimilation per weight of chlorophyll a) for phytoplankton photosynthesis is related to the growth rate and the carbon/chlorophyll a ratio in the phytoplankton. Since maximum expected growth rate can be estimated from temperature, the maximum expected assimilation number can also be estimated if the carbon/chlorophyll a ratio in the phytoplankton crop is known. Assimilation numbers for Antarctic seas are low as would be expected from the low ambient temperatures. Tropical seas and temperate waters in summer of ten show low assimulation numbers as a result of low ambient nutrient concentrations. However, coastal estuaries with rapid nutrient regeneration processes show seasonal variations in the assimilation number with temperature which agree well with expectation. (Oleszkiewicz-Vanderbilt)
W74-04233

REGULATION OF BRAIN AND EYE TEMPERATURES BY THE BLUEFIN TUNA,
Woods Hole Oceanographic Institution, Mass. Dept. of Biology.
D. S. Linthicum, and F. G. Carey.
Comparative Biochemistry and Physiology, Vol 43A, No 2, p 425-433, 1972, 4 fig, 1 tab, 12 ref.

Descriptors: *Temperature, *Marine fish, *Regulation, *Fish physiology, Animal metabolism, Biology, Water temperature, Metabolism, Animal physiology.
Identifiers: *Tuna(Bluefin).

The brain and eye of bluefin tuna (Thunnus thynnus) are warmer than the water. In fish from 20C water, brain temperatures averaged about 27C, eye temperatures about 26C and maximum muscle temperatures about 30C. Brain, eye and muscle temperatures are regulated so that there is only a 5-6 C variation over the water temperature range of 7-23C. A counter-current heat-exchange system in the blood supply to the brain and eye allows metabolic heat to accumulate in these organs and raise their temperatures. (Neszkiewicz-Vanderbilt)
W74-04239

BODY HEAT DISSIPATION AND CONSERVATION IN TWO SPECIES OF DOLPHINS,
California State Coll., Hayward. Dept. of Biological Sciences and Health Sciences.
S. M. McGinnis, G. C. Whittow, C. A. Ohata, and H. Huber.

Comparative Biochemistry and Physiology, Vol 43A, No 2, p 417-423, 1972. 9 fig, 7 ref.

Descriptors: *Temperature, *Marine animals, *Animal physiology, Heat, Heat flow, Heat budget, *Animal metabolism, Biology, Insulation, Pacific Ocean, Water temperature, Oceans, Heat transfer, *Mammals.
Identifiers: *Dolphins.

Deep core, body subcutaneous and dorsal fin subcutaneous temperatures were continuously recorded via radio-telemetry from an unrestrained Hawaiian spinner and Pacific bottlenose dolphin. Body subcutaneous temperatures were several degrees Centigrade below deep core whereas dorsal fin subcutaneous temperatures were far more variable. At low water temperatures body wall insulation increased whereas dorsal fin insulation failed to rise above the lower values exhibited by the body wall. The body wall serves as a flexible insulator while the dorsal fin is a major site of heat dissipation. (Oleszkiewicz-Vanderbilt)
W74-04240

THE EFFECT OF CHANGES IN AMBIENT TEMPERATURE ON SPONTANEOUS ACTIVITY IN SKIPJACK TUNA,
Hawaii Univ., Honolulu. Dept. of Zoology.
E. D. Stevens, and F. E. J. Fry.
Comparative Biochemistry and Physiology, Vol 42A, No 3, p 803-805, 1972, 1 fig, 5 ref.

Descriptors: *Marine fish, *Temperature, *Lethal limit, Fish, Environmental effects, Fish physiology, Biology, Fish behavior, Heat, *Water temperature, Oceans, Physiology, Movement.
Identifiers: *Tuna(Skipjack).

One factor in regulation of body temperature in skipjack tuna involves the regulation of the heat production by varying the level of spontaneous swimming activity in the face of changes in ambient temperature. The spontaneous activity of skipjack tuna tended to remain unchanged in the face of a gradual decrease in ambient temperature from 24 to 16C. One fish cooled further showed a rapid decline in activity at 14C and died at 13C. In the temperature range tested, skipjack tuna can only maintain a constant temperature differential between body and ambient temperature. Regulation of constant body temperature appears possible only above an ambient temperature at 25C through a decrease in the level of spontaneous activity. (Oleszkiewicz-Vanderbilt)
W74-04241

HEATING AND COOLING RATES IN FOUR SPECIES OF TURTLES,
Florida Univ., Gainesville. Dept. of Physiology.
D. C. Spray, and M. L. May.
Comparative Biochemistry and Physiology, Vol 41A, No 3, p 507-522, 1972, 4 fig, 3 tab, 36 ref.

Descriptors: *Turtles, *Cooling, *Heating, *Temperature, *Animal physiology, Bioassay, Biology, Conduction, Heat balance, Metals, Insects, Physiology, Animal behavior, *Reptiles.

Two basking turtles, Chrysemys picta and Pseudemys scripta, heat significantly faster than they cool. Two terrestrial species, Gopherus polyphemus and Terrapene carolina, cool significantly faster than they heat. The rate of heat exchange in dead basking turtles is the same as the cooling rate in living animals; dead terrestrial turtles have rates of heat exchange similar to their living heating rates. After section of the dorsal roots of the spinal nerves innervating its carapace, Chrysemys rate of heat exchange in both directions is similar to its rate of heating before section. These rates of heating and cooling have been compared with other rates in the literature and equations relating the rate of heat exchange to body weight of reptiles from different habitats have been calculated. The findings are interpreted as suggestive of active control of conductance, utilized differently by turtles from two diverse habitats. (Oleszkiewicz-Vanderbilt)
W74-04243

SEASONAL VARIATION IN HEART RATE RESPONSE TO CORE TEMPERATURE CHANGES,
Indiana Univ., Bloomington. Dept. of Anatomy and Physiology.
L. C. Miller, and S. Mizell.
Comparative Biochemistry and Physiology, Vol 42A, No 3, p 773-779, 1972, 4 fig, 1 tab, 6 ref.

Descriptors: *Temperature, *Frogs, *Animal pathology, *Bioassay, Distribution patterns, Physiology, Biology, Environmental effects, Water temperature, Lakes, Seasonal, Diurnal distribution, Metabolism.

The heart rate of normal, intact, unrestrained, unanesthetized, adult male Rana pipiens was studied over a range of core temperatures (16-32C) throughout a 12-month period. During the summer, heart rate response to increasing temperature was linear with a slope of 4.5. During the winter, the heart rate response was linear with a slope of 2.9 up to a core temperature of 26C. At temperatures above this point the response was not as large with a calculated slope of 1.61. Also the linearity above 26C was not as marked. During intermediate months the response was intermediate with no predictable patterns. (Oleszkiewicz-Vanderbilt)
W74-04244

DIEL VARIATION IN THE THERMAL TOLERANCE OF LITORIA GRACILENTA (ANURA: HYLIDAE),
University of New Zealand, Armidale (Australia). Dept. of Zoology.
C. R. Johnson.
Comparative Biochemistry and Physiology, Vol 41A, No 4, p 727-730, 1972, 1 fig, 2 tab, 14 ref.

Descriptors: *Temperature, Heat, *Amphibians, *Resistance, *Thermal stress, Animal pathology, Biology, adaptation, Physiology, Pathology, *Australia, *Diel migration.
Identifiers: *Litoria gracilenta, *Anurans.

Critical thermal maxima (CTM) were determined at various intervals during the diel cycle for Litoria gracilenta acclimated at 15 and 25C in Australia. The CIM fluctuates over a 24-hr period with significant differences occuring among testing periods for both acclimation temperatures. Data are given for other species of Australian anurans and suggest that daily variations in heat resistance may be widespread in anurans. (Oleszkiewicz-Vanderbilt)
W74-04245

ORGANIC MATTER OF THE SOIL IN THE KIEV RESERVOIR AND ITS ROLE IN THE DEVELOPMENT OF BENTHIC ALGAE, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. V. Skorik, K. S. Vladimirova, G. A. Enaki, and I. K. Palamarchuk.
Gidrobiol Zh. Vol 8, No 3, p 82-86. 1972. Illus.
Identifiers: Algae, Amino-Acids, *Benthic algae, Color, Diatoms, Euglena, *Organic matter, Reservoirs, Soils, *USSR(Kiev reservoir), Cyanophyta, Chlorophyta, Phytocenoses.

The role of bottom soil in the accumulation of the phytomicrobenthic biomass, consisting of diatoms, blue-green and green algae and Euglena was investigated. A direct relationship was found between the content of hydrolyzed forms of organic matter and the biomass of bottom phytocenoses. A study of the effect of amino acids on the development of phytomicrocenoses and the relationship among biomass, water color and amino acid content in soil extracts showed that the algae had a positive reaction to amino acids as a N source. It was concluded that phyto-groupings of algae were determined by the dynamics of water movement and organic matter in its hydrolyzed form.--Copyright 1973, Biological Abstracts, Inc.
W74-04281

PRIMARY PRODUCTION OF PHYTOPLANKTON AND DESTRUCTION OF ORGANIC MATTER IN THE PRUT RIVER, (IN RUSSIAN),
V. M. Shalar', and A. A. Untura.
Izv Akad Nauk Mold SSR Ser Bio Khim Nauk. 3, p 3-7. 1972.
Identifiers: *Organic matter, Photosynthesis, *Phytoplankton, *Primary production, Rivers, Seasonality, *USSR(Prut River), Waste water.

Results are presented of seasonal investigations of the primary production of phytoplankton and destruction of organic matter in the Prut River (USSR). The entire length of the river was investigated. The rate of photosyntheses in the river is rather high and differs in individual stretches. The magnitude of primary production of phytoplankton on the whole increases downstream as the biomass increases, but the increase of primary production in not proportional to the increase of the biomass. An adverse effect of the waste waters of the city of Chernovtsy on the rate of photosynthesis of phytoplankton was noted.--Copyright 1973, Biological Abstracts, Inc.
W74-04284

UTILIZATION OF AROMATIC COMPOUNDS BY BENTHIC MICROORGANISMS OF A EUTROPHIC LAKE,
Nicolas Copernicus Univ. of Torun (Poland). Inst. of Biology.
E. Strzelczyk, W. Donderski, and W. Lewosz.
Acta Microbiol Pol Ser B Microbiol Appl. Vol 4, No 4, p 191-200. 1972.
Identifiers: *Aromatic compounds, Benthos, *Eutrophic lakes, *Microorganisms, Eutrophication.

Studies were carried out on the capability of utilizing different aromatic compounds by benthic microorganisms isolated from 2 types of bottom sediment of an eutrophic lake. The 'dy' mud harbored more organisms capable of attacking the individual aromatics applied than the sandy sediment. The non-chromogenic microorganisms were able to utilize more aromatic substances than the chromogens isolated from the 'dy' sediment, but a reverse phenomenon was observed with the sandy sediment isolates. The microorganisms utilizing aromatic compounds as the sole source of C were identified to the generic level.--Copyright 1973, Biological Abstracts, Inc.
W74-04295

CHLOROPHYLL-A AND PHAEOPHYTIN: THEIR RELATIONSHIPS WITH THE CONCENTRATIONS OF NITROGEN AND PHOSPHORUS IN THE SESTON OF LAKE MONATE (NORTH ITALY), (IN ITALIAN),
European Atomic Energy Community, Ispra (Italy). Biology Div.
M. F. Baudouin, and O. Ravera.
Ann Limnol. Vol 8, No 1, p 1-10. 1972. Illus. English summary.
Identifiers: Asterionella-Formosa, Ceratium-Hirudinella, *Chlorophylla, Fragilaria-Crotonensis, Lakes, *Nitrogen, *Pheophytin, *Phosphorus, Phyto-plankton, Seasons, *Seston, *Italy(Lake Monate).

The absence of a correlation between dry weight and concentrations of chlorophyll, N and P is probably due to the presence of animal and mineral detritus in the nannoseston of Lake

Monate. In spite of this, chlorophyll concentration gives an indication of the amount of phytoplankton in a body of water. The 3 peaks in chlorophyll concentration during the year (spring, summer and autumn) are due respectively to the following species: Asterionella formosa, Ceratium hirundinella and Fragilaria crotonensis. The spring bloom is the most important and chlorophyll a concentration is more than 25 mg/m3 at a depth of 7 m. The concentration of pheopigments increases with depth and season (maximum in summer). It was possible to utilize the relationship suggested by Lorenzen (1970), and calculate the mean concentration of chlorophyll/m2 from analyses of samples collected at given depths.--Copyright 1973, Biological Abstracts, Inc.
W74-04300

5D. Waste Treatment Processes

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA PAPER INDUSTRY,
Auburn Univ., Ala. Water Resources Research Inst.
N. K. Modani, and W. H. Holley, Jr.
Availability from NTIS as PB-227 279 $5.50 in paper copy, $1.45 in microfiche. Water Resources Research Institute Bulletin 13, 1973. 174 p, 3 fig, 37 tab, 51 ref. OWRR C-3292 (No 3715)(3).

Descriptors: *Alabama, *Economic Impact, Industrial wastes, Marketing, *Pollution abatement, *Prices, *Pulp and paper industry, Treatment facilities, Cost analysis, Competitive prices, *Competition.

To assess the impact of water pollution abatement on competition and pricing in the Alabama paper industry, data were derived through two main sources: the manufacturers and the purchasers. The capital and operating costs of water pollution abatement equipment were allocated per unit of output to determine the additional costs per unit for water pollution abatement. Based on this and the products each of the firms produced, the possible weighted average cost increase per unit of production was estimated using a mathematical model for each of the ten major product sectors. This estimated cost increase was less than 2 percent of the average wholesale product price for all the product sectors. All the manufacturers revealed that these additional costs will be passed on to their purchasers, if and when possible. The majority of intermediate purchasers--dealers and converters--did not anticipate shifting to another domestic supplier as long as the price increase from their present supplier was 3 percent or less than the current market price. Further, the purchasers did not anticipate shifting to a foreign supplier as long as the price increase from their present supplier was 6 percent or less than the current market price on the international market. The majority of purchasers revealed that they will pass on all price increases from their manufacturers to their customers. (See also W74-01101; W74-02437 and W74-03753)
W74-03752

THE ECONOMIC BENEFITS OF ABATING WATER POLLUTION IN THE STEEL, TEXTILE, AND PAPER INDUSTRIES IN ALABAMA,
Auburn Univ., Ala. Water Resources Research Inst.
H. B. Pickle, A. C. Rucks, and R. Sisson.
Availability from NTIS as PB-227 334 $4.75 in paper copy, $1.45 in microfiche. Water Resources Research Institute Bulletin 14, 1973. 129 p, 14 fig, 39 tab, 35 ref. OWRR C-3292(No 3715)(4).

Descriptors: *Alabama, *Benefits, *Industrial wastes, *Pollution abatement, *Recreation, Aquatic life, *Industrial water, Water utilization, Pulp and paper industry, *Cost comparisons. Identifiers: Steel industry, Textile industry.

Economic values were computed for three water uses: water-oriented recreation, aquatic life propagation, and industrial water use. To evaluate economic benefits, the extent was determined to which effluents from paper, steel, and textile mills affected water quality. Water quality criteria were developed for the evaluation of actual water quality. The comparison of existing quality conditions to appropriate criteria determined the number of river miles which could not be used for a beneficial water use. The 64 stream miles determined unsuited for water-oriented recreation in Alabama could develop $2,000,000 annually in economic benefits under adequate pollution abatement. Pollution abatement along 89.1 stream miles which are adversely affected by effluents from steel, textile, and paper mills, would increase bordering land value $16,067 per mile per year or approximately $1.45 million annually. Annual benefits in aquatic life propagation would be $662,699. Annual savings from reduced preindustrial water treatment would amount to $356,272. The total economic benefit derived by controlling water pollution from the paper, steel, and textile industries of Alabama is approximately $4.5 million per year. (See also W74-01101; W74-02437 and W74-03752) (Norman-Alabama)
W74-03753

ILLINOIS STORM SEWER SYSTEM SIMULATION MODEL: USER'S MANUAL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
A. S. Sevuk, B. C. Yen, and G. E. Peterson.
Availability from NTIS as PB-227 338 $5.50 in paper copy, $1.45 in microfiche. University of Illinois Urbana Water Resources Center Research Report No 73, 1973, 168 p, 19 fig, 3 append. OWRR B-043-ILL(9). 14-31-0001-3078.

Descriptors: *Illinois, *Simulation analysis, *Storm drains, *Computer models, *Hydraulic design, Drainage systems, Flood routing, Hydrograph, Hydraulics, Mathematical models, Open channel flow, Unsteady flow, Urban runoff.

The Illinois Storm Sewer System Simulation Model is a mathematical model for sewer design and flow prediction utilizing the St. Venant equations to route unsteady flows through tree-type sewer networks. An overlapping segment scheme is used in the numerical solutions to account for the backwater effects and mutual influences of the sewers and junctions. The program is written in PL/1 and assembler Language consisting of more than 3000 statements and can be executed on most large IBM 360 and 370 systems. User oriented information is provided. An example on sewer design is also given.
W74-03763

PROCESS CONTROL OF ACTIVATED SLUDGE TREATMENT,
Kentucky Water Resources Inst., Lexington.
R. I. Kermode, and R. W. J. Brett.
Availability from NTIS as PB-227 238 $4.00 in paper copy, $1.45 in microfiche. Research Report No 63, 1973. 88 p, 18 fig, 40 ref, 9 tab. OWRB(1) A-040-KY. 14-31-0001-3517. 14-31-0001-3817.

Descriptors: *Activated sludge, *Simulation analysis, Environmental engineering, Mathematical models, Optimization, Quality control, *Sewage treatment, Settling basins, *Waste water treatment, Environmental control.
Identifiers: *Process control, Aerator models, Substrates.

General feed forward controllers, conforming to standard control modes, have been derived for an activated sludge process. The analysis indicated that the appropriate controllers are proportional control with measurement of substrate flow rate, and derivative control with measurement of inlet substrate concentration, and manipulation of the rate of return sludge by both controllers. The performance of these controllers was tested by computer simulation of five dynamic aerator models with and without sludge storage, and with two settling basin models. In all cases significant reduction of the maximum exit substrate concentration was achieved. Additional improvement resulted from the use of sludge storage. As the aerator model became more linear the control results also improved. The first dynamic results were obtained using a perfect steady state settler model, the remainder assumed that the settler dynamics could be represented by a variable time delay. The addition of the settler dynamics caused the control to degrade somewhat. Finally the generality of the two controllers was proved mathematically for the five biological kinetic models for substrate utilization and bacterial growth. (Grieves-Kentucky)
W74-03764

EVALUATION OF THERMAL POLLUTION CONTROL ALTERNATIVES,
National Environmental Research Center, Corvallis, Oreg.
B. A. Tichenor.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 7, p 7-1--7-22, 1973. 10 fig, 1 tab, 10 ref.

Descriptors: *Water pollution control, *Thermal pollution, *Thermal powerplants, Water temperature, Water reuse, Cooling towers, *Cooling water, Waste water treatment.
Identifiers: Cooling ponds.

The methods available to control pollution by cooling water discharges include site selection, intake and discharge design, and closed-cycle cooling. Site selection is the first and most important step in providing electric power with a minimum of environmental degradation. If adequate water for once-through cooling is available, careful evaluation and design of intake and discharge structures must precede the decision to use a once-through system. In almost all cases, closed-cycle cooling systems are viable alternatives to once-through cooling for thermal powerplants. They are definitely feasible from an engineering standpoint, but they do have environmental side effects which must be assessed and controlled. (Knapp-USGS)
W74-03791

HEATED SURFACE DISCHARGES INTO FLOWING AMBIENT STREAMS AND LAKES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
E. Silberman.
In: Environmental Impact on Rivers (River Mechanics III), edited and published by Hsieh Wen Shen, Fort Collins, Colo, Chapter 10, p 10-1--10-44, 1973. 7 fig, 1 tab, 37 ref.

Descriptors: *Thermal pollution, *Cooling water, Water pollution effects, Thermal powerplants, Path of pollutants, Mixing, Model studies, Hydraulic models, Mathematical, Waste water treatment.

Cooling water can be provided for powerplants in various ways. Recycling through open or closed cooling towers or through cooling ponds is possible. However, the most economical method for large plants where natural water bodies are available has been the once-through cooling system wherein water is withdrawn from the water body, pumped through the condensers, and returned to the water body at higher temperature. For economic and other reasons, this method will probably continue to be used for many new powerplants where environmental constraints can be satisfied. Discharge from a surface canal usually results in higher surface temperatures, and hence more rapid transfer of heat from the water to the atmosphere, than does discharge from a sub-

merged outlet. A submerged outlet produces more rapid mixing and dilution of the warm water prior to its appearance at the surface. Thus a larger volume of water may be heated near the outlet than in the surface canal case, but to a lower temperature. Surface canals are generally more economical than submerged outlets, but limits on maximum temperature rise may restrict their use. (Knapp-USGS)
W74-03794

PILOT SCALE INVESTIGATIONS OF WELL RECHARGE USING CORED SAMPLES,
Illinois State Water Survey, Urbana.
H. F. Smith, R. J. Schicht, and H. W. Humphreys.
Paper No 11 of Artificial Groundwater Recharge Conference, University of Reading, England, Sept 21-24, 1970, Vol 2: The Water Research Association, Marlow, England, p 279-296, June 1971. 6 fig, 1 tab, 9 ref.

Descriptors: *Artificial recharge, *Injection wells, *Reclaimed water, *Waste water treatment, *Water reuse, Sandstones, Water quality, Water chemistry, *Illinois.

Laboratory studies were conducted in Illinois to determine if artificial recharge of sandstone aquifers with sewage effluent is feasible. The apparatus used in this research consisted of four main components: (1) permeameter; (2) filters; (3) chlorinator; and (4) constant head tank. The Ironton-Galesville sandstone, since it is the most productive formation in the deep sandstone aquifer, was selected for investigation. The core samples are described by the Illinois State Geological Survey as fine to medium grained sandstone, moderately well sorted, and friable. The median grain size is 0.30 mm, with the maximum grain size about 0.75 to 1.0 mm. After discharge of deionized water through the sandstone core has stabilized, filtered and chlorinated sewage effluent was recharged. A pretreated effluent of the type used could be successfully recharged through a sandstone well having similar characteristics to the cores used. The pretreatment would consist of removal of solids, a disinfectant, and control of pH. Sand filters are the most reliable type of filter with fewer problems of maintenance. (Knapp-USGS)
W74-03823

GROUNDWATER RECHARGE FOR WASTE WATER RECLAMATION AND/OR STORAGE OF SUPPLIES: A COST COMPARISON WITH CONVENTIONAL METHODS,
Asian Inst. of Tech., Bangkok (Thailand).
R. J. Frankel.
Paper No 14 of Artificial Groundwater Recharge Conference, University of Reading, England, September 21-24, 1970, Vol 2: The Water Research Association, Marlow, England. p 359-383, June 1971. 2 fig, 10 tab, 27 ref.

Descriptors: *Artificial recharge, *Water reuse, *Reclaimed water, Economics, *Waste water treatment, Cities, Water resources development, Land use, Water management(Applied), *Cost comparisons.

Renovation and reuse of waste waters through artificial recharge of aquifers represents an attractive alternative to other advanced reclamation processes, to low-flow augmentation and higher treatment costs prior to stream disposal, and to surface storage of municipal water supplies. A groundwater recharge reclamation system is also amenable to development in small increments over time. Coordination of land and water resources programs would greatly enhance the development of groundwater recharge systems. When the land used for spreading grounds is in the vicinity of urban development and is considered in future urban planning, the more expensive the land used for recharge purposes, the less expensive is the cost of water if land values are appreciating at a high enough rate. (Knapp-USGS)
W74-03825

THE FUTURE PROSPECTS OF ARTIFICIAL GROUNDWATER RECHARGE,
California Univ., Berkeley.
D. K. Todd.
Paper No 15 of Artificial Groundwater Recharge Conference, University of Reading, England, September 21-24, 1970, Vol 2: The Water Research Association, Marlow, England, p 385-399, June 1971. 45 ref.

Descriptors: *Artificial recharge, *Underground waste disposal, *Water reuse, Reclaimed water, Waste disposal wells, Injection wells, Water storage, *Waste water treatment.

The traditional basis for artificial recharge has been to augment groundwater storage using water obtained from controlled releases of upstream reservoirs or from importations. The method provides for storage of large volumes of water in natural reservoirs without the cost of building a surface reservoir. Moreover, in the Western United States few sites remain where it would be economically feasible to construct dams. Storing water underground has the advantages of minimizing evapotranspiration losses, equalizing water temperatures, providing natural filtration, and insuring a protected local water supply during times of emergency. More than 400 cities in the United States now use their treated effluent for agricultural irrigation or groundwater recharge. Water reclamation systems may be classified into infiltration basins, ridge-and-furrow, spray-irrigation, spray-runoff, and recharge wells. Renovation is most successful when wastewater is applied to a soil system which incorporates vegetation, such as a woodlot, pasture, or cropped land. Removal of nutrients by the vegetation produces a better quality of water than if the vegetation were absent. The major problems of water reclamation systems are maintenance of high infiltration rates and removal of odor and taste. Recharge rates can be maximized by alternate wetting and drying cycles of surface installations and by periodic redevelopment of recharge wells. The injection of liquid wastes into deep underground formations by means of wells is in reality a storage method rather than a disposal method because the wastes injected into the stratum remain there indefinitely. It is often not recognized that most potential injection zones are filled naturally with brine or another unusable fluid, hence the pore space only becomes available by displacement or extraction of the natural fluid, which merely relocates the disposal problem. (Knapp-USGS)
W74-03826

OCCUPATIONALLY RELATED HEALTH HAZARDS IN WASTEWATER TREATMENT SYSTEMS,
Ottawa Univ. (Ontario).
For primary bibliographic entry see Field 5C.
W74-03853

MIXED CULTURE BIOOXIDATION OF PHENOL. III. EXISTENCE OF MULTIPLE STEADY STATES IN CONTINUOUS CULTURE WITH WALL GROWTH,
State Univ. of New York, Buffalo. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5C.
W74-03881

THE EFFECTIVENESS OF SAND FILTERS FOR THE REMOVAL OF COLLOIDAL MANGANESE OXIDES FROM WATER USING SELECTED CATIONS AS FILTER AIDS,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 5F.
W74-03893

DISTRIBUTIONAL IMPACTS OF ENVIRONMENTAL QUALITY MANAGEMENT: THE CASE OF FEDERAL GRANTS FOR WATER POLLUTION CONTROL,
New York State Coll. of Agricultural and Life Sciences, Ithaca.
L. E. Gosse, and R. J. Kalter.
Available from the National Technical Information Service as PB-227 473; $3.75 in paper copy, $1.45 in microfiche. Cornell University Water Resources and Marine Sciences Center, Ithaca, Technical Report 41, June 1972. 48 p, 1 fig, 16 tab, 3 append. OWRR C-2199(3409)(4).

Descriptors: Distribution, *Environmental control, Management, *Grants, *Water pollution control, Waste water treatment, *Income distribution, *Federal government, Treatment facilities, *Economic impact, Progressive taxes, Human population, United States.

Income redistribution effects of waste water treatment grants were estimated for each state in a federal program. The impact of progressive income taxes and grant formulae, which were intended to favor states with low income per capita, were shown to have little net redistribution effects in fact. High per capita income states still were treated favorably in most cases because they also had high population bases.
W74-03894

PHYSICAL-CHEMICAL WASTEWATER TREATMENT PLANT DESIGN,
CH2M/Hill, Corvallis, Oreg.
G. Culp, L. G Suhr, D. R. Evans, and R. L. Woodward.
Environmental Protection Agency, Technology Transfer Seminar Publication, August 1973. 41 p, 6 fig, 12 tab, 13 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Design criteria, Coagulation, Filtration, Activated carbon, Lime, Sludge disposal, Specifications, Estimated costs, Sludge, Cost comparisons.
Identifiers: *Physical-chemical treatment, Sludge recovery.

Typical design parameters for the unit processes involved in physical-chemical treatment of raw wastes and how the design engineer may determine the design criteria best suited for a given wastewater are described. Preliminary data necessary includes determination of the best coagulant, the amount of sludge produced, how well the sludge dewaters, practicability of coagulant recovery, the particulate, colloidal, soluble, and nonadsorbable fraction of organics in the raw wastewater, the fraction of soluble organic phosphorus and nitrogen in the raw wastewater, carbon contact time required, and the effluent quality that can be expected. Niagara Falls, N.Y., and Fitchburg, Mass., are sites used in design project descriptions. At Niagara Falls a physical-chemical process was selected largely because of the objectionable constituents would not have been removed by biological processes. At Fitchburg the process was chosen because of the better quality effluent produced, and the greater stability in operation, as compared with biological treatment. The choice was clear in each case. (Slattery-Wisconsin)
W74-03957

RECYCLED WATER,
E. R. Hartley.
Science Digest, Vol 70, p82-86, November 1971. 2 photo.

Descriptors: *Florida, *Sewage treatment, *Filtration, Sewage effluents, Nuclear energy, Activated carbon, Aeration, Carbon filters, Soil fil-

ters, Tertiary treatment, Water pollution, Water pollution treatment, Water quality, *Recycling, Waste water treatment.

Development of practical, nuclear-powered purification systems for recycling sewage has been accomplished with an irradiation unit in operation in Palmdale, Florida. The irradiation unit contains a core of pencils filled with Coblat-60, which breaks down the components of sewage, producing an odorless effluent. At the Palmdale facility, waste water moves into a wet well where large pieces of organic matter are screened out or broken up. The effluent then moves into an aeration tank where air is introduced, moiling the waste water and breaking down some of the materials. The water is then circulated through the core of the irradiation unit for ninety minutes, and when it emerges it is perfect for agricultural use. After being deposited in a holding tank, the effluent is filtered through a diatomaceous earth filter and finally through an activated carbon filter, producing water good enough to drink. There is no volume limitation on the system and it can be added to existing secondary treatment facilities. Experts predict nuclear sewage disposal to be eventually no more expensive than presently used thorough tertiary treatment. (Ritchie-Florida)
W74-03976

INDUSTRIAL WATER POLLUTION CONTROL--AN OVERVIEW,
Rex Chainbelt, Inc., Milwaukee, Wis.
W. C. Messinger.
Vital Speeches, Vol 38, p 632-635, 1972.

Descriptors: *Water pollution, Control, *Industrial wastes, *Chemical wastes, Sewage, Regulation, Environmental effects, Biochemical oxygen demand, Economic impact, Pollution abatement, Control, Streams, Waterways, Federal government, Municipal wastes, *Waste water treatment.

The Rex Company makes pollution control and abatement machinery and systems. The ecology division of the company conducts scientific study programs, engineering evaluation, laboratory sampling analyses, and other activities. The principal work done by Rex in industrial pollution control is chemical waste treatment. The industrial water pollution problem is dramatized by the fact that industry in the U.S. discharges nearly three times as much biochemical oxygen demand (BOD) as all municipalities. Industries are now beginning to do much more in the control of pollution by expending much more money and effort. The costs to clean up the streams and waterways are tremendous and must be borne by government, industry, and the consumer. Also because of more stringent regulations established by the Environmental Protection Agency, it sometimes becomes necessary to shut down some polluters that cannot comply. With a joint effort of government and industry much progress can and is being made. (Daniels-Florida)
W74-04028

WATER RENOVATION FOR UNRESTRICTED RE-USE,
Corps of Engineers, Washington, D.C.
T. D. Hinesly.
Water Spectrum, Vol 5, No 2, p 1-8, 1973. 3 illus, 7 photo, 1 chart.

Descriptors: *Waste water treatment, *Water balance, *Irrigation, *Water conservation, *Water reuse, Soil conservation, Industrial wastes, Municipal wastes, Soil-water-plant relationships, Trafficability, Soil infiltration, Soil erosion, Nutrients, Waste treatment, Soil management, Drainage effects, Land development.
Identifiers: Spray irrigation treatment.

Spray irrigation land treatment has the greatest applicability to different soil types and cultural practices of all methods of wastewater treatment. As wastewater quantities increase in a particular region, spray irrigation systems are easily expanded to cover greater areas. Maximum benefits are realized from the plant and animal nutrients recycled in growing plants, which is the most important reason for choosing irrigation over other land treatment systems when possible. Many of these nutrient elements are becoming increasingly scarce and more costly to replace in soils. The most important aspect of spray irrigation land treatment is selecting a site where the frequencies and rates of water applications will be limited by the soil's capacity to filter, absorb and precipitate pollutants, rather than by soil hydraulic characteristics. The primary or short term limitation on wastewater applications should be the ability to manage cropping systems for nitrogen removal. Successful operation is dependent upon the types of vegetation and cultural practices employed. Many are concerned that maximizing water applications will lead to increased soil erosion on sloping lands. But the same crop and soil management practices effective in controlling soil erosion will apply during wastewater renovation. Flooding or health hazards also will not be a problem. (Silber-Florida)
W74-04034

BATCH DISINFECTION OF TREATED WASTEWATER WITH CHLORINE AT LESS THAN 1 DEG C,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
R. C. Gordon, and C. V. Davenport.
Copy available from GPO Sup Doc as EP1.23:660/2-73-005, $0.65; microfiche from NTIS as PB-228 092 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-005, September 1973. 31 p, 6 tab, 29 ref. EPA Project 16100 GKG.

Descriptors: *Disinfection, *Waste water treatment, *Bioindicators, *Coliforms, *Chlorine, *Winter, Alaska, Bacteria, Chlorination.
Identifiers: Total coliforms, Fecal coliforms, Batch disinfection, Low temperature.

A laboratory study was conducted, using batch treatment technique, to gain some insight into chlorine disinfection of waste treatment system effluents at less than 1 deg C. One primary and three secondary effluents were examined at the low temperature with parallel control samples at 25 deg C. Effluent disinfection was considered minimally effective if, after one hour contact time in the presence of 1 mg/l total chlorine residual, there were no more than 1000 total and 200 fecal coliforms/100 ml. The results indicated that both chlorine demand and the rate or extent of coliform reduction were decreased at the low temperature. The disinfecting ability of chlorine varied significantly at less than 1 deg C, among the four effluents studied. These effects did not in themselves negate the effectiveness of chlorine as a disinfectant at low temperature because the previously stated minimums were easily met in effluent from all sources. However, higher bacterial quality can be expected from batch treatment than is found in most short-circuit plagued operating contact chambers. The only real measure of satisfactory disinfection is the number of enteric bacteria being discharged into the receiving water. An arbitrary chlorine residual after a predetermined contact time cannot be considered prima facie evidence of satisfactory disinfection because of the variable disinfecting ability of chlorine. The chlorine residual:contact time relationship must be established for each effluent at the lowest temperature encountered in the system. (EPA)
W74-04042

TREATMENT OF HAZARDOUS MATERIAL SPILLS WITH FLOATING MASS TRANSFER MEDIA,
Battelle-Pacific Northwest Labs., Richland, Wash.
B. W. Mercer, A. J. Shuckrow, and G. W. Dawson.
Copy available from GPO Sup Doc as EP1.23:670/2-73-078, $1.25; microfiche from NTIS as PB-228 050 $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-078, September 1973. 93 p, 32 fig, 9 tab, 10 ref. EPA Project 15090 HGQ. Contract 68-01-0124.

Descriptors: *Activated carbon, *Ion exchange, *Resins, Water pollution treatment, Water pollution control, Mass transfer, *Waste water treatment.
Identifiers: *Hazardous materials spills, *Hazardous chemicals.

An approach for the in situ treatment of spills of soluble hazardous polluting substances was developed and demonstrated on a field scale for a static body of water. Laboratory scale experimentation showed that floating sorbents and ion exchange resins could be highly effective removal agents when applied as small particles beneath the surface of contaiminated waters. A lightweight commercial activated carbon was found to be particularly effective for removing organic substances such as phenol, aromatic hydrocarbons, and organophosphorus insecticides from water. Floating ion exchange resins were also prepared for use on spills of acid, alkalis, and toxic salts. Hollow glass microspheres are incorporated in the resin granules for buoyancy. Field demonstrations were conducted using carbon contained in weighted plastic gallon bottles. The carbon proved highly effective in removing an organophosphorus pesticide spilled in a large basin, and was easily collected through use of an oil containment boom. Ice encapsulated floating anion exchange resin beads were similarly employed to neutralize a spill of sulfuric acid. (EPA)
W74-04043

FABRIC BOOM CONCEPT FOR CONTAINMENT AND COLLECTION OF FLOATING OIL,
CONSULTEC, Rockville, Md.
For primary bibliographic entry see Field 5G.
W74-04044

SELECTIVE NUTRIENT REMOVAL FROM SECONDARY EFFLUENT,
Process Research, Inc., Cambridge, Mass.
J. L. Eisenmann, and J. D. Smith.
Copy available from GPO Sup Doc as EP1.23:670/2-73-076, $1.75; microfiche from NTIS as PB-228 108 $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-076, September 1973. 155 p, 61 fig, 31 tab, 9 ref. EPA Project 17010 FBJ. 14-17-179.

Descriptors: *Separation techniques, *Membrane processes, *Sewage effluents, *Waste water treatment, *Nitrates, *Phosphates, *Ammonia, Permselective membranes, Dialysis, Diffusion, Membranes, Permeability, Water pollution sources, *Nutrient removal, Sewage treatment, Ion exchange.
Identifiers: Donnan dialysis, *Exchange diffusion, Secondary effluents, Selective separation.

Exchange diffusion (Donnan dialysis) with ion-exchange membranes was investigated as a potential process for the removal of nitrate, phosphate and ammonia from secondary sewage plant effluents. Using commercial ion-exchange membranes and plate-and-frame configuration ninety percent removals were obtained in laboratory and pilot scale experiments. Ammonium removal appears to be economically feasible while a combined nitrate-phosphate system is only marginally economic at the present state of development. Improvements in cell configuration and membranes

are suggested as a means of improving the process costs. (EPA)
W74-04045

U-TUBE AERATION,
Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
R. C. Mitchell.
Copy available from GPO Sup Doc as EP1.23:670/2-73-031, $2.00; microfiche from NTIS as PB-228 127 $1.45. Environmental Protection Agency, Technology Series Report EPA 670/2-73-031, September 1973. 186 p, 62 fig, 11 tab, 34 ref. EPA Project 17050 DVT. 68-01-0120.

Descriptors: *Aeration, *Sulfide control, *Odor control, *Corrosion control, *Aerobic conditions, Water pollution control, Sewers, Effluent streams, Natural streams, Oxygenation, Design, Performance, *Waste water treatment, *Sewage treatment.
Identifiers: *Aerators(U-tube).

The results of two experimental and analytical projects to develop and evaluate the U-tube aeration concept are presented. Experimental data were obtained to characterize the mass transfer and fluid dynamics behavior of U-tube systems over large ranges of design variables and operating conditions. Tests were made first with a pilot-scale (2-inch diameter) U-tube. Subsequently, full-scale (8- to 20-inch diameter) prototype systems were successfully designed, constructed (under EPA grant projects), and operated in sanitary sewer systems in Jefferson Parish, Louisiana, and Port Arthur, Texas. These field installations have been effective in reducing previous serious odor and corrosion problems resulting from sulfides. No maintenance has been required for aspirated-air systems in approximately 2 years of continuous operation. Mass transfer and fluid dynamics correlations, plus a design computer program, were developed for use in designing U-tube systems. A satisfactory basis for design now exists, although additional improvements are needed. U-tube systems are a practical, flexible, efficient method for aeration for a number of applications. They are well-suited to applications in which it is desired to raise the oxygen concentration of a moving stream, even to saturation. (EPA)
W74-04046

WATER RECOVERY AND SOLID WASTE PROCESSING FOR AEROSPACE AND DOMESTIC APPLICATIONS.
Martin Marietta Corp., Denver, Colo.
Available from NTIS, Springfield, Va. 22151 N-73-19161 Price $4.25 printed copy; $1.45 microfiche. Final Report, Executive Summary, National Aeronautics and Space Administration, Manned Spacecraft Center Report MCR-73-7, January 1973. 33 p, 2 fig, 3 tab. NASA NAS9-12504.

Descriptors: *Waste water treatment, *Recycling, *Water supply, *Control systems, Methodology, Potable water, Aircraft, Rural areas, Design criteria, Domestic water, *Water reuse.
Identifiers: Domestic water systems, *Spacecraft water systems.

The formulation of the preliminary design of a water management system is described. The system is suitable for closed loop recycling of wastewater to potable water for a group of (500) dwelling units. Also included is a summary of the design, development, manufacture, and demonstration of a system which will provide data applicable to both aerospace and domestic systems. Tasks conducted during this program included: studies of domestic water use profiles and available domestic plumbing hardware; establishment of a baseline concept; review of aerospace technology concepts and hardware for domestic application, establishing candidate unit treatment processes; formulation of the preliminary design; development of a computer program for system performance determination, and a conceptual test program. (Woodard-USGS)
W74-04053

DIGITAL COMPUTER PROGRAMS FOR THE COST ENGINEER.
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
Available from the National Technical Information Service as PB-213 974, $5.00 in paper copy, $1.45 in microfiche. March 1971. 29 p.

Descriptors: *Computer programs, *Costs, *Waste water treatment, *Utilities, Performance, Waste water disposal, Water demand, Design, Estimating, Engineering, Sewerage, Operation and maintenance, Regional analysis, Air pollution.
Identifiers: Payroll computer program.

Specific digital computer programs employing various analytical techniques are described, their availability and computing systems indicated, and sources of information concerning them identified in order to catalogue existing opportunities for high-speed solution of cost engineering problems. The programs are applicable to performance of the activated sludge process, cost estimating for wastewater treatment plants, and evaluation of water supply and wastewater disposal (including seawater distillation and wastewater renovation). Also, models are included for design of wastewater treatment systems, complete secondary treatment systems, electrodialysis process, lime recalcination, reverse osmosis, sludge fluidized bed incineration, tertiary treatment by lime addition, ammonia stripping, waste stabilization pond, microscreen process, trickling filter, and ion exchange, other programs are applicable to job cost accounting for payroll and expenses, estimates for engineering and construction projects, payroll system for contractors, design of a sanitary sewer system, accounting of computer time cards, flow data at outlying sewage pumping stations, control and direct maintenance in waste treatment, record keeping, chemical processing plant cost estimating, complete domestic waste treatment system design, equipment analysis of a sewage plant system, and regional air pollution analysis. Solution techniques include simulation analysis, integer linear programming, cost accounting schemes, and the critical path method. (Weaver-Wisconsin)
W74-04087

INTENSIVE OUTDOOR CULTURE OF MARINE PHYTOPLANKTON ENRICHED WITH TREATED SEWAGE EFFLUENT,
Woods Hole Oceanographic Institution, Mass.
W. M. Dunstan, and K. R. Tenore.
Aquaculture, Vol 1, No 2, p 181-192, 1972. 4 fig, 5 tab, 18 ref.

Descriptors: *Aquiculture, *Harvesting of algae, *Marine algae, *Sewage treatment, Nutrients, Mollusks, Oysters, Mussels, Shellfish, Carbon, Phosphates, Nitrogen, Phosphorus, Silica, Diatoms.
Identifiers: *Outdoor culture, Cylindrotheca closterium, Prasinoculadus subsalsa, Chaetoceros simplex.

Research results are described in which mixed, natural populations of marine phytoplankton, enriched with secondary sewage effluent, were grown and harvested daily from 400-liter outdoor tanks. The single daily dilution culture method provided good yields. The harvested cells were subsequently used on a daily basis to feed bivalve molluscs. Chlorinated, secondary sewage effluent was collected directly from the treatment plant. Algal cultures initiated by pumping sea water from one meter below the surface. After enrichment with sewage or artificial medium, the natural mixed population of algae was allowed to grow for 4-7 days until it reached maximum density. Using a daily harvest rate of 50%, yield in algae ranged from one to five grams carbon/sq m/day, averaging 2.6 over the four-month period. Under outdoor conditions, sewage enrichment of sea water in the tanks stimulated growth of various microalgae usually dominant in the water before enrichment. Several sources and samples of sewage effluent were successfully used for enrichment. Possible control of species composition was demonstrated using different nutrient combinations. The objectives of the combined tertiary sewage treatment-aquaculture system is simultaneously to produce algae while removing the inorganic nutrients from the sewage effluent. (Jones-Wisconsin)
W74-04103

CHEMICAL CHANGES IN THE WATER AND ACCUMULATION STRATUM OF SOILS IN PONDS FERTILIZED WITH BEET-SUGAR FACTORY WASTES,
For primary bibliographic entry see Field 5C.
W74-04110

COST ANALYSIS OF OPTIONAL METHODS OF SHIPBOARD DOMESTIC WASTE DISPOSAL,
C. H. Piersall, Jr., and R. E. Borgstrom.
Naval Engineers Journal, Vol 85, No 1, p 86-92, February 1973. 5 tab, 5 ref.

Descriptors: *Cost analysis, *Domestic wastes, Ships, *Waste water treatment, Water quality control, Annual, Investment, Oceans, Operating costs, Mathematical models, Equations, Systems analysis, Estimating, *Waste disposal.
Identifiers: Sea-going surface ships, Surface fleet, Total cost, Sensitivity analysis, *Shipboard waste disposal.

The problem of costs of sewage and waste disposal from U.S. Navy ships is considered. Presented is a cost analysis of four major options for disposal of shipboard domestic waste, with modifications to two of the options. The annualized investment and operating costs associated with the implementation of each of the options are given. The model used considers non-nuclear, seagoing surface ships with a manning level greater than 50 men. The approach of developing estimates on a per ship per class basis and aggregating them for the total surface fleet permits the investigation of different combinations of the options merely by specifying the number and type of ships to be considered in any option. Results of a sensitivity analysis of total costs per option to changes in investment and operating costs, and to variation in fleet size, are given. (Bell-Cornell)
W74-04115

DESIGN AND COST ALLOCATION ALGORITHM FOR WASTE TREATMENT SYSTEMS,
Thayer School of Engineering, Hanover, N.H.
D. L. McConagha, and A. O. Converse.
Journal Water Pollution Control Federation, Vol 45, No 12, p 2558-2566, December 1973. 1 fig, 2 tab, 8 ref.

Descriptors: *Waste water treatment, *Regions, Costs, *Design, Optimization, Construction costs, Pipes, Rivers, Treatment facilities, Mathematical models, Systems analysis, Regional analysis.
Identifiers: *Regional planning, *Cost minimization, *Heuristic algorithm, Trunk sewers, Location, Decomposition techniques.

Economies of scale result in significant savings when waste from several communities is treated in a single regional facility. However, a trade-off exists between the savings in treatment costs and the cost of transporting the waste from communities

to the regional plant. Presented is a heuristic algorithm for the regional planning of wastewater treatment systems. The objective is to determine the optimal combination of waste treatment plants and interconnecting trunk sewers so that all wastes generated within the region can be treated at minimum cost. The system consists of a number of distinct sources of waste (communities or towns) located in a designated region. Average daily flow of wastewater generated at each source, the elevation of each source, and the length of possible trunk sewer connections between sources are specified. The heuristic algorithm yields, in most cases, the optimal collection-treatment system for a set of sources located in an arbitrary arrangement: it allows branched collection systems. Convergence is always obtained, but the answer is dependent upon the starting conditions. In the systems studied to date, however, the algorithm has always yielded the minimum cost solution when the assumed starting configuration is treatment at each source with no collection. (Bell-Cornell)
W74-04116

COMPUTER-ASSISTED ACTIVATED SLUDGE PLANT OPERATION,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
P. G. Lacroix, and D. E. Bloodgood.
Effluent and Water Treatment Journal, Vol 13, No 11, p 701-714, November 1973. 3 fig, 2 tab, 26 ref.

Descriptors: *Activated sludge, *Treatment facilities, *Operation and maintenance, *Simulation analysis, *Computer programs, *Mathematical models, Water quality control, Waste water(Pollution), Waste water treatment, Control, Design, Systems analysis, *Indiana.
Identifiers: *Fort Wayne(Ind).

Activated sludge plants are difficult to operate; problems arise from the varying nature of the purifying wastewater characteristics and the difficulty of maintaining a readily settleable sludge. Presented is a computer program based on mathematical models that are formulated from full-sized plant operation data, that simulate an activated sludge system, and that can assist plant operators in controlling and optimizing treatment plant performance. A computer-assisted plant operation study describes the possible use of computers for operating the Fort Wayne, Indiana wastewater treatment facilities, which have been represented elsewhere by five mathematical models. The models are presented, and they predict at specified stations the mixed liquor suspended solids in the aeration tank effluent, return sludge suspended solids from the sedimentation tank, and suspended solids and BOD in the final plant effluent. The computer program (Conventional Activated Sludge System Operation), written in FORTRAN IV, is a computational scheme that solves simultaneously the solids balance and the mathematical equations that describe the activated sludge system. The computation is strictly for steady-state conditions, and the program is arranged to simulate many design and operating conditions. The computer program, CASSO, can simplify the operation of an activated sludge plant; CASSO can be used as a tool for any one day of activated sludge operation. (Bell-Cornell)
W74-04119

MANAGEMENT OF RADIOACTIVE AQUEOUS WASTES FROM AEC FUEL-REPROCESSING OPERATIONS,
Division of Production and Materials Management (AEC), Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-04188

WASTE WATER IMPURITY LEVEL AFFECTS FLOCCULATION EFFICIENCY OF POLYELECTROLYTES,
Swedish Inst. for Surface Chemistry, Stockholm.
S. Friberg, K. Roberts, and A.-M. Wennerberg.
Ambio. Vol 1, No 5, p 180-181. 1972. Illus.
Identifiers: Aluminum sulfate, Bacteria, *Electrolytes, *Flocculation, Polyelectrolytes, Sedimentation, *Waste water treatment, *Chemical precipitation, Settling rates.

The rates of chemical sedimentation of domestic waste water and bacteria with aluminum sulfate and polyelectrolytes vary with changing concentrations of certain dissolved organic impurities (protein, lipid and saccharide) present in the system. Proteins increase, while saccharides and lipids decrease the sedimentation rate. This may explain the periodic variation in efficiency of chemical sedimentation often observed in domestic waste water plants.--Copyright 1973, Biological Abstracts, Inc.
W74-04195

EXPLICIT CALIBRATION OF THE PILLS II SYSTEM,
Environmental Systems Corp., Knoxville, Tenn.
F. M. Shofner.
Copy available from GPO Sup Doc as EPI.23:660/2-73-011, $0.65; microfiche from NTIS as PB-228 094, $1.45. Environmental Protection Agency Technology Series Report EPA-660/2-73-011, September 1973. 28 p, 7 fig, 4 ref. EPA Project 16130 GNK.

Descriptors: *Cooling towers, *Measurement, *Calibrations, Instrumentation, Generators, Distribution, Treatment facilities.
Identifiers: *Drift measurement, *Electro-optic instruments.

The basic characteristics of the PILLS I and II Systems are reviewed and up-dated from previous publications. Emphasis is given to the explicit calibration of PILLS II with water droplets. The operational characteristics and accuracy of the monodisperse particle generator are discussed. General procedures for deriving the particle density distribution from the measured voltage density distribution are described. (See also W72-10818) (EPA)
W74-04198

THE DIRECT-CYCLE NUCLEAR GAS TURBINE WITH ECONOMICAL DRY AIR COOLING,
Gulf General Atomic Co., San Diego, Calif.
J. M. Krase, D. C. Morse, and T. W. Schoene.
Proceedings of the American Power Conference, Vol 34, p 512-520, 1972. 4 fig, 3 ref.

Descriptors: *Electric power production, *Cooling, *Thermal pollution, *Nuclear reactors, Thermal power plants, Research and development, Design, Design criteria, Nuclear energy, Structural engineering, Environmental control, Heat transfer, Air temperature, Economics, Turbines.
Identifiers: *Dry air cooling, Dry cooling towers.

The High-Temperature Gas-Cooled Reactor (HTGR) is a possible answer to the problem of thermal pollution in the aquatic environment. It is the most efficient of available nuclear power plants and therefore has the least thermal discharge. Also, it has a near zero radioactivity release and it eliminates combustion products in the atmosphere. The use of air cooling increases possible plant sites, has no make-up water requirement and avoids the problems associated with evaporating cooling. The reactor and other key elements of HTGR gas turbine plant design are dicussed briefly, and alternative designs are considered. The licensing and construction activities on the first HTGR gas turbine plant are expected to require 5 1/2 years, followed by 2 years for start up and extensive initial testing. The advantages of the direct cycle include the heat rejection potential, lower plant costs, and possible safety and operational advantages. The potential of increased future efficiency of these types of plants is great. The high temperature of the rejected heat may be useful in a number of processes. (Jerome-Vanderbilt)
W74-04230

THERMAL POLLUTION AND ITS CONTROL,
Washington Univ., St. Louis, Mo. Program in Technology and Human Affairs.
For primary bibliographic entry see Field 5B.
W74-04234

5E. Ultimate Disposal Of Wastes

THE FUTURE PROSPECTS OF ARTIFICIAL GROUNDWATER RECHARGE,
California Univ., Berkeley.
For primary bibliographic entry see Field 5D.
W74-03826

THE EFFECT OF FLUX AND GRAVITATIONAL FORCES ON MISCIBLE DISPLACEMENT IN A THIN HOMOGENEOUS BED,
Louisiana State Univ., Baton Rouge. Dept. of Petroleum Engineering.
For primary bibliographic entry see Field 2F.
W74-03896

COST ANALYSIS OF OPTIONAL METHODS OF SHIPBOARD DOMESTIC WASTE DISPOSAL,
For primary bibliographic entry see Field 5D.
W74-04115

TRANSIENT PRESSURE TESTING OF FRACTURED WATER INJECTION WELLS,
Pan American Petroleum Corp., Tulsa, Okla.
For primary bibliographic entry see Field 8G.
W74-04147

DISPOSAL OF RADIOACTIVE WASTES INTO THE UNDERGROUND IN THE FEDERAL REPUBLIC OF GERMANY - A SURVEY ON PRACTICAL EXPERIENCE AND R AND D WORK,
Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).
W. Hild.
Report No. KFK-1820, April 1973. 26 p, 7 fig, 1 tab, 10 ref.

Descriptors: *Nuclear powerplants, *Radioactivity, *Effluents, *Radioactive waste disposal, *Mining, *Saline deposits, Water pollution, Biological properties, Biological treatment, Natural resource, Oil, Withdrawal, Tritium, Geologic formations.
Identifiers: *Germany.

In the Federal Republic of Germany solid and solidified wastes are disposed of in the salt mine Asse. A short review is given of the extensive R and D programs under way; practical experience gained during routine disposal operations is described. Deep-well injection of tritium-containing effluents into isolated depleted oil horizons of the deep underground is being studied as an approach to tritium disposal which does not lead to pollution of the biosphere. (Houser-ORNL)
W74-04171

WAT'S NEW IN DEEP-WELL INJECTION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
H. Bouwer.

Civil Engineering, Vol 44, No 1, p 58-61, January 1974. 3 fig.

Descriptors: *Waste disposal wells, *Injection wells, *Conferences, Reviews, Industrial wastes, Radioactive wastes, *Waste water disposal, Regulations, Water pollution control.

The Symposium on Underground Waste Management and Artificial Recharge was held in New Orleans in September. The Symposium was devoted to the use of the earth's crust for the disposal or treatment of liquid wastes, a field rapidly gaining interest, spurred on by 'no discharge' legislation. Care should be taken that freshwater aquifers are not contaminated and the environment is not adversely affected. Earthquakes and seismic activity may also result. Most of the 280 injection wells in the United States are used for injecting surplus water, storm runoff, or sewage effluent (sometimes with water recovery in dry periods). Four percent of the wells installed were outright failures. Sixty percent are still operating. Cost of well injection may be $2 to $50 dollars per cubic meter. Most wells are several hundred to several thousand m deep. The injection rates are usually below 3 liter per sec and the injection pressure may be around 20 atm at the well head. Deep-well injection is governed by state regulations, and will be subject to federal policy in the future. (Knapp-USGS)
W74-04265

5F. Water Treatment and Quality Alteration

THE EFFECTIVENESS OF SAND FILTERS FOR THE REMOVAL OF COLLOIDAL MANGANESE OXIDES FROM WATER USING SELECTED CATIONS AS FILTER AIDS,
Wyoming Univ., Laramie. Water Resources Research Inst.
S. R. Jenkins.
Available from the National Technical Information Service as PB-227 234; $3.25 in paper copy, $1.45 in microfiche. Water Resources Series No 41, January 31, 1974. 29 p, 11 fig, 2 tab, 7 ref. OWRR B-011-WYO(1).

Descriptors: *Wyoming, *Water treatment, Filters, *Filtration, *Coagulation, Cations, Colloids, Costs, Oxides.
Identifiers: *Sand filter, *Manganese oxides.

A mathematical-chemical relationship derived to predict the most effective concentrations of Ca2+ for coagulation of manganese oxide particles and deposition on a rotating disc type silica surface was shown to predict the effective concentration of Ca2+ for removal of manganese oxide by model rapid sand filters. The concentration of calcium necessary to cause effective removal of manganese oxide was shown to be stoichiometric with the oxide concentration. The relationship derived was acceptable in predicting the removal efficiency of both 1-inch ID - 4-inch deep and 4-inch ID - 3-foot deep sand filters. Differences in pH had little effect on the maximum effectiveness concentration of Ca2+. However, precoating of the sand with Ca2+, and rate of filtration were shown to greatly effect the concentration of Ca2+ for effective manganese oxide removal. The cost of treating naturally occuring waters of Wyoming was shown to be small if rapid sand filtration plants were available. For example, most Wyoming waters contained enough Ca2+ that further additions of this cation would not have to be made. Consequently, the only cost would be the cost of oxidizing the manganese. If MnO4 was used as an oxidant the cost was shown to be about 0.19 cents/cap/day. In rare cases where lime would have to be added to increase the Ca2+ concentration, the cost would rise to only 0.34 cents/cap/day. Unfortunately, most Wyoming communities do not have existing sand filtration plants making the removal of manganese by this method uneconomical. The benefit gained by removing the manganese is usually not worth building a filter plant soley for that purpose.
W74-03893

THE ABILITY OF SOME MINERALS TO ADSORB VIRUSES FROM WATER(IN UKRAINIAN),
L. I. Hloba, L. M. Lastovet's, and M. M. Rotmistrov.
Mikrobiol Zh (Kiev). Vol 34, No 1, p64-65. 1972.
Identifiers: Adsorption, Amnion cells, Disinfection, Human virus, Microorganisms, *Minerals, *Viruses(Coxsackie B-3), *Water treatment.

Palygorskite (attapulgite), bentonite, agloporite, vermiculite and silica gel were most effective in adsorbing the Coxsackie B3 virus from water. A study of viral biological activity on human amnion cells indicated the kaolin and palygorskite, treated with Al+3 or dimethyldialkylammonium chloride decreased cell survival. The effective mineral may be used in disinfecting water containing pathogenic microorganisms and viruses.--Copyright 1973, Biological Abstracts, Inc.
W74-03978

WATER SAMPLING AND LABORATORY SERVICE,
Bridgeport Hydraulic Co., Conn.
For primary bibliographic entry see Field 5A.
W74-04024

SAFE DRINKING WATER ACT OF 1972--S.3994.
For primary bibliographic entry see Field 5G.
W74-04030

SELECTIVE NUTRIENT REMOVAL FROM SECONDARY EFFLUENT,
Process Research, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5D.
W74-04045

THE APPLICATION OF FUNDAMENTAL LIMNOLOGICAL RESEARCH IN WATER SUPPLY SYSTEM DESIGN AND MANAGEMENT,
Metropolitan Water Board, West Molesey (England). Queen Elizabeth II Reservoir.
For primary bibliographic entry see Field 5C.
W74-04111

THE 'TENACIOUS' IRON BACTERIA,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 5B.
W74-04143

CORROSION AND ITS PREVENTION IN WATERS,
National Chemical Lab., Teddington (England).
For primary bibliographic entry see Field 8G.
W74-04151

5G. Water Quality Control

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA PAPER INDUSTRY,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 5D.
W74-03752

THE ECONOMIC BENEFITS OF ABATING WATER POLLUTION IN THE STEEL, TEXTILE, AND PAPER INDUSTRIES IN ALABAMA,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 5D.
W74-03753

ALASKA WATER RESOURCES RESEARCH NEEDS FOR THE 70'S.
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 6B.
W74-03757

THE EFFECTS OF ARTIFICIAL SUNLIGHT UPON FLOATING OILS,
Chelsea Coll. of Science and Technology, London (England). Dept. of Pharmacy.
For primary bibliographic entry see Field 5B.
W74-03777

EVALUATION OF THERMAL POLLUTION CONTROL ALTERNATIVES,
National Environmental Research Center, Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W74-03791

CHEMICAL AND BIOLOGICAL SURVEY OF THE SAVANNAH RIVER ADJACENT TO ELBA ISLAND,
Skidaway Inst. of Oceanography, Savannah, Ga.
For primary bibliographic entry see Field 5B.
W74-03804

WATER RESOURCES MONITORING AND EVALUATION--A KEY TO ENVIRONMENTAL PROTECTION IN ALABAMA OIL FIELDS,
Geological Survey, Tuscaloosa, Ala.
For primary bibliographic entry see Field 5B.
W74-03807

AN INDUSTRIAL POLLUTION INDEX,
Winthrop Coll., Rock Hill, S.C. Dept. of Economics.
J. H. Padgett, and R. A. Stanford.
Water Resources Bulletin, Vol 9, No 2, p 320-327, 1973. 2 tab, 1 append.

Descriptors: *Social impact, Planning, Optimal development plans, *Industrial wastes, Industrial production, Air pollution, Water pollution, Water quality standards, *Alternative planning.
Identifiers: *Industrial pollution index, Social cost.

Industrial waste comes concomitant with industrial development. Little is known about how to incorporate costs associated with these wastes into development decisions. An industrial pollution index is suggested as a method to illustrate to developers the social costs arising from alternative manufacturing processes and sectors. The index incorporates a number of measures of pollution arising from each process, summarizing them into a single number. It is constructed by: (a) normalizing each measure; (b) weighting the normalized data for each measure and (c) summing the resultant weighted normalized data for a single industry. A program designed to calculate composite index numbers from available input data of twenty or less variables and 150 or less observations per variable is given. The index is illustrated using 1965 Standard Industrial Classification (SIC) two-digit industries, recognizing two forms of pollution, air and water, and weighing each equally. Expenditures on fuel and water discharged are used as proxy variables to indicate probable environmental pollution. The result gives the petroleum and coal, primary metals and paper and allied products industries the worse ranking; machinery and furniture and fixtures industries the best. (Schroeder-Wisconsin)

W74-03889

NATIONAL WATER COMMISSION REPORTS.
For primary bibliographic entry see Field 6B.
W74-03890

LET'S ENFORCE THE RULES,
For primary bibliographic entry see Field 6E.
W74-03891

DISTRIBUTIONAL IMPACTS OF ENVIRONMENTAL QUALITY MANAGEMENT: THE CASE OF FEDERAL GRANTS FOR WATER POLLUTION CONTROL,
New York State Coll. of Agricultural and Life Sciences, Ithaca.
For primary bibliographic entry see Field 5D.
W74-03894

SOCIAL ACCOUNTING APPROACHES TO WATER RESOURCE USE IN ECONOMIC DEVELOPMENT.
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W74-03907

CONCEPTS OF EXTERNALITIES AND SOCIAL COSTS,
Auburn Univ., Ala. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-03908

OPPORTUNITY COSTS AND WATER RESOURCE USE,
Auburn Univ., Ala. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-03909

REGIONAL INTERDEPENDENCIES AND EXTERNAL DISECONOMIES,
Auburn Univ., Ala. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W74-03912

EFFECT OF ARTIFICIAL WATER AERATION ON BASIN ALGAL FLORA, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 5C.
W74-03918

WEED CONTROL IN SUGAR BEET CROPS IN THE KOSOVO REGION, (IN SERBO-CROATIAN),
Agricultural Inst., Pristina (Yugoslavia).
For primary bibliographic entry see Field 3F.
W74-03943

COMMON PROPERTY, CONGESTION, AND ENVIRONMENTAL POLLUTION,
Wisconsin Univ., Madison. Dept. of Economics.
For primary bibliographic entry see Field 6G.
W74-03958

ACCOUNTING FOR POLLUTION: POLLUTION ABATEMENT AND THE NATIONAL PRODUCT,
Michigan State Univ., East Lansing. Dept. of Economics.
M. Weinrobe.
Lad Economics, Vol 49, No 2, p 115-121, 1973. 2 ref.

Descriptors: *Gross National Product, *Welfare(Economics), *Pollution abatement, *Measurement, Technology, Industrial production.

Identifiers: *Pollution abatement devices, Social accounting, Pollution control capital.

Products creating pollutants provide two forms of externalities reducing physical productivity and direct individual satisfaction. A method to account for pollution abatement devices (PADs) in national accounts is examined. PADs reduce losses of the type noted above, although they create no new goods by themselves; they represent intermediate goods necessary to attain reductions in pollution losses and, therefore, should not be added to the national product. Two cases are examined to illustrate this point: Under full employment conditions, the productions of PADs represent sacrifices of other goods. The proper accounting method would be to subtract the cost of the PAD's from the present national product and add the expected reduction in pollution losses. Under conditions of less than full employment, it may not be necessary to subtract the production cost of PADs, since the resources consumed may have no opportunity cost. While the theory appears clear, the difficulty in ascertaining the value of the reduction of pollutant losses arising from the use of PADs has led to the use of production costs as a proxy. In full employment, GNP would not change as a result of the calculations--in fact it may either increase or decrease. (Schroeder-Wisconsin)
W74-03959

THE POLLUTION SUB-SYSTEM,
For primary bibliographic entry see Field 6G.
W74-03964

CLEANING UP A RIVER,
C. Kennedy.
Underwater Naturalist, Vol 7, No 4, p 4-12, (1973). 1 map, 4 photo, 8 chart.

Descriptors: *Baseline studies, Sewage treatment, *Outfall sewers, *Pollution abatement, *Shallow water, *New Jersey, Water quality, Water pollution, *Sewerage, Chemical analysis, Tides, Winds, Abatement, Water quality control, Rivers.

The American Littoral Society conducted a study of the Navesink River in New Jersey upon learning that the river's basin was to undergo thorough sewering within a few years. The society thought it would be useful to record the state of the river before its pollution abatement started, so that the results of abatement could be measured by subsequent studies. The discharge from sewage outfalls was the major source of pollution in the river. The Littoral Society's river study established a water quality baseline with the major source of river pollution still in operation. (Comfort-Florida)
W74-03968

WATER POLLUTION.
For primary bibliographic entry see Field 6E.
W74-03972

ASSAULT ON A LAKE,
J. McCaull.
Environment, Vol. 14, No. 7 p 33-39, September, 1972. 3 photo, 17 ref.

Descriptors: *Federal Water Pollution Control Act, *Waste disposal, *Lake Michigan, *Public health, *Municipal wastes, Water pollution, Chemicals, Detergents, Sewage, Illinois, Legislation, Effluents, Environmental effects, Water policy, Water quality, Regulation, Water pollution sources, Industrial wastes, Eutrophication, Biochemical oxygen demand, Water pollution control.

In 1968 because of the serious pollution of Lake Michigan, the then governor of Illinois called an interstate conference under the provisions of the federal water pollution control act to discuss the problem, recommend solutions, and write regulations to control the pollution of the lake. Some of the problems of the lake were industrial pollution from oils, sulfates, and other chemicals as well as municipal sewage and agricultural runoff that produced overfertilization of inshore waters, thereby causing eutrophic problems. The biological concentration of these long-lived contaminants defy the concept of dilution upon which much waste disposal engineering rests. The potential damage to human health is difficult to quantify. The early pattern of thinking about waste disposal still persists today with only a token integration of insights provided by the biological sciences. Today's technology of water pollution control is based on pragmatic concepts that need thorough reevaluation if a comprehensive science is to be developed. (Daniels-Florida)
W74-03975

THE POTOMAC, WATER QUALITY PLANNING.
Interstate Commission on the Potomac River Basin, Bethesda, Md.
Proceedings of a Seminar held at New Carrollton, Maryland, May 10, 1973. 32 p, 3 fig.

Descriptors: *Interstate commissions, *River basin commissions, *Potomac River, Interstate compacts, Water resources, Basins, River basins, River basin development, Water quality control, Economics, Pollution, Land use, Planning, Water supply.

The topics discussed in this seminar include: the Water Resources Council and Basin Planning, Legislative Goals and Constraints for Water Quality Planning, Federal Water Quality Planning Requirements, the proposed Potomac River Basin Compact, Economics in Planning, and Citizen Participation in the Planning Process. The full text of each presentation is included along with a summary. The Commission has plans to promote and realize a Basin-wide effort on planning. The program includes: evaluation of non-point pollution sources, loading allocation system, land-use planning, water supply, monitoring of water quality and analysis of trends, and coordination of all planning activities in the Basin. (Sears-Florida)
W74-03977

OIL ON THE WATERS: MODEST PROGRESS IN CLEANUP TECHNOLOGY,
J. Arehart-Treichel.
Science News, Vol 102, p250-252, October 14, 1972. 4 photo.

Descriptors: Oil spills, Oil industry, Oil pollution, Water pollution, Water pollution sources, Disasters, Oceans, Chemicals, Environmental control, Detergents, Equipment, Legislation, Coordination, Federal government, Water pollution control, Chemical wastes, Oil wastes.

With soaring international demands for energy and petroleum transport, it became inevitable that oil spills would occur. The United States along with the oil and tanker industries launched efforts to devise effective and nontoxic techniques to clean up oil spills. After several years of research and experimentation, results are beginning to show for effective cleanup. Thin-layer chemicals can be used to herd oil together and to thicken it, so it can be scooped from the water. Other commercially built devices, skimmers, and methods are being developed. The Coast Guard is stockpiling equipment in various areas so that it can be flown to the scene of any disaster. The Environmental Protection Agency has not recommended or required any particular cleanup approach, because the approach depends on location, types of equipment available, sea conditions and type of oil. Oil spill cleanups have also improved as personnel have become better trained. Also, more stringent laws have helped improve oil cleanups. (Daniels-Florida)
W74-03979

PETTERSON V. FROEHLKE (CHALLENGE TO DREDGING PERMIT ISSUED BY CORPS OF ENGINEERS).
For primary bibliographic entry see Field 6E.
W74-03983

COMMONWEALTH V. HARMAR COAL CO. (DENIAL OF MINE DRAINAGE PERMITS).
For primary bibliographic entry see Field 6E.
W74-03984

IOWA WATER POLLUTION CONTROL COMMISSION V. TOWN OF PATON (AUTHORITY TO COMPEL TOWN TO CHANGE ITS SEWAGE SYSTEM).
For primary bibliographic entry see Field 6E.
W74-03985

PORTLAND PIPE LINE CORPORATION V. ENVIRONMENTAL IMPROVEMENT COMMISSION (CONSTITUTIONALITY OF A STATE STATUTE).
For primary bibliographic entry see Field 6E.
W74-03988

DISCLOSURE OF UNLAWFUL OIL DISCHARGE PROVIDES IMMUNITY FROM PROSECUTION,
A. O. Black.
Houston Law Rev., Vol 10, p 732-739, March 1973. 50 ref.

Descriptors: *Water pollution, *Water Quality Improvement Act, *Environmental control, *Oil Spills, Legislation, Discharges, Oil pollution, Water pollution sources, Navigable water, Pollution control, Pollution abatement, Water pollution control.
Identifiers: Coastal waters, Oil pollution act.

Under the Water Quality Improvement Act, any person, including a corporation, who discloses, to the appropriate authorities, evidence of an oil discharge prohibited by the act, shall be immune from all criminal prosecution based upon such evidence. The Water Quality Improvement Act of 1970 prohibits the discharge of oil from any source into the navigable waters of the United States. The court reasoned that the granting of immunity encourages the disclosure of unlawful discharges, implying that the immunity clause should be extended as broadly as possible so as to facilitate pollution abatement. This broad immunity even includes immunity from prosecution under other pollution control acts. However, it does not apply to prosecution supported by evidence gathered by independent means. (Daniels-Florida)
W74-03989

VILLAGE OF CORNWALL V. ENVIRONMENTAL PROTECTION ADMINISTRATION OF THE CITY OF NEW YORK (APPROVAL SOUGHT FOR INTERCONNECTION WITH AQUEDUCT).
348 N Y S 2d 319 (Sup Ct 1973). 6 p.

Descriptors: *Judicial decisions, *New York, *Aqueducts, *Water supply, *Water transfer, Water law, Legal aspects, Legislation, Cities, Tunnels, Pumped storage, Watersheds(Basins), Local governments, Water storage, Water rights.

Village-petitioner filed application with respondent for approval of interconnection with aqueduct, which carried water from upstate watershed area to New York City. The Water Supply Act allows any municipality through which the aqueduct passes, as a matter of right, to take and receive water from the aqueduct. Respondent withdrew conditional approval of the connection, contending it had no duty to permit connection if it entails an unreasonable risk of damage to the aqueduct, or to the supply of those served by the aqueduct. Respondent further contended no duty existed because the connection was made necessary by an unreasonable abandonment by petitioner of its existing water supply, and that the petitioner's application was related to the plan of a public utility to construct a pump storage facility, and therefore was on behalf of that public utility and not the municipality. The New York Supreme Court for Orange County held that the right to connect with the aqueduct is not conditional upon the prior approval of the municipal objective in seeking the water supply, and that the connection will not pose danger to the aqueduct or the water supply of other municipalities. (Ritchie-Florida)
W74-03995

HILLSBOURGH COUNTY ENVIRONMENTAL PROTECTION COMMISSION V. FRANDORSON PROPERTIES (DELIBERATE DESTRUCTION OF MANGROVES IN TIDAL WATERS NOT FORBIDDEN).
For primary bibliographic entry see Field 6E.
W74-03996

INTERSTATE COMPACTS AND REGIONAL WATER RESOURCES PLANNING AND MANAGEMENT,
For primary bibliographic entry see Field 6E.
W74-04000

KENTUCKY POLLUTION ABATEMENT AUTHORITY.
For primary bibliographic entry see Field 6E.
W74-04002

DEPARTMENT OF NATURAL RESOURCES--WATER RESOURCE.
For primary bibliographic entry see Field 6E.
W74-04005

PLANNING AND ZONING-LAND SUBDIVISIONS.
For primary bibliographic entry see Field 6E.
W74-04006

FRIENDS OF THE EARTH V. ARMSTRONG (ENVIRONMENTAL PROTECTION SUIT).
For primary bibliographic entry see Field 6E.
W74-04007

UNITED STATES V. TOBIN PACKING CO. (VIOLATION OF RIVERS AND HARBORS ACT).
For primary bibliographic entry see Field 6E.
W74-04008

OHIO V. CALLAWAY (INJUNCTION ACTION FOR FAILURE TO COMPLY WITH NEPA).
For primary bibliographic entry see Field 6E.
W74-04009

UNITED STATES V. CANNON (INJUNCTION AGAINST VIOLATION OF RIVERS AND HARBORS ACT).
For primary bibliographic entry see Field 6E.
W74-04010

UNITED STATES V. UNITED STATES STEEL (REFUSE ACT VIOLATION).
For primary bibliographic entry see Field 6E.
W74-04011

WATER POLLUTION CONTROL.
For primary bibliographic entry see Field 6E.
W74-04015

LITTERING OF PROPERTY AND WATERS.
For primary bibliographic entry see Field 6E.
W74-04017

SUPERVISION OF OIL, GAS, AND NATURAL DRY GAS WELLS.
For primary bibliographic entry see Field 6E.
W74-04018

FLORIDA WATER RESOURCES ACT OF 1972.
For primary bibliographic entry see Field 6A.
W74-04019

THE FUTURE OF WATER QUALITY CONTROL,
R. K. Golemon.
Texas Bar Journal, Vol 36, p 505-514, June 1973. 126 ref.

Descriptors: *Federal Water Pollution Control Act, *Water Quality Act, *Water quality standards, *Baseline studies, *Legal review, Legislation, Abatement, Water pollution control, Effluents, Wastes, Industrial wastes, Toxins, Law enforcement, Water quality, Discharge.
Identifiers: State permit program.

Some of the more important provisions of the Water Pollution Control Act Amendments of 1972 are reviewed. The change in the enforcement mechanism of the Federal Water Pollution Control Program is described. Previously water quality standards, i.e., standards for the quality of the water in the receiving stream were to be set as the control mechanism. Now the basis of pollution prevention and elimination will be the application of effluent limitations, i.e., requirements on effluent stream quality at the point of discharge. The two phase program established for application and enforcement of effluent limitations is analyzed and criticized. Also discussed are the amendments which provide for revision and updating of stream water quality standards established under the Water Quality Act of 1965, the permit system for discharges including the permanent state permit program, the toxic and pretreatment effluent standards and various general provisions. These general provisions include plant inspection, monitoring of equipment and gaining access to records by the Environmental Protection Agency and the greatly expanded role of federal enforcement authority with respect to water pollution. (Gragg-Florida)
W74-04026

OAKLAND INNER HARBOR, ALAMEDA COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 8A.
W74-04027

SAFE DRINKING WATER ACT OF 1972--S.3994.
Report of Senate Comm. on Commerce on S.3994, (Together with Supplemental Views) 92nd Cong, 2d Sess, September 15, 1972. 43 p.

Descriptors: *Water quality standards, *Legislation, *United States, *Potable water, Environmental sanitation, Public health, Water purification, Water utilization, Governments, Legal aspects, Water quality control, Water treatment.

The proposed Safe Drinking Water Act of 1972 would establish a program within the Environmental Protection Agency to regulate drinking water quality. Currently, the regulation of public drinking water systems is primarily a state responsibility. The federal government does exercise some control over drinking water aboard interstate carriers but that authority is limited to prohibiting the use of contaminated water. The proposed legislation provides that EPA establish minimum federal

drinking water standards prescribing maximum limits for contaiminants as well as standards for the operation and maintenance of drinking water systems and surveillance, monitoring, site selection and construction standards for public water systems to assure safe dependable drinking water. The EPA would also establish recommended standards to assure esthetically adequate drinking waters, although the states will be primarily responsible for enforcing the standards. The federal government will act only if the states fail to act in cases of imminent hazard. The Act further provides that a National Drinking Water Council be established to advise the administrator on scientific and engineering matters. (Mockler-Florida)
W74-04030

HIGH SEAS INTERVENTION: PARAMETERS OF UNILATERAL ACTION,
For primary bibliographic entry see Field 6E.
W74-04031

THE OCEAN DUMPING CONVENTION--A HOPEFUL BEGINNING,
T. L. Leitzell.
San Diego Law Review, Vol 10, No 3, p 502-513, May 1973. 46 ref.

Descriptors: *Water pollution, *Law of the Sea, *International law, *Treaties, *Pollution abatement, Aquatic life, Marine fisheries, Water pollution control, Organizations, Marine biology, Ocean water, Impaired water quality, Ecology, Environmental control, Waste disposal.

The Convention on the Prevention of Marine Pollution By Dumping of Wastes and Other Matter in the Oceans is viewed as a positive step toward global pollution control. The participating nations agreed the real force of the convention was in the controlling of vessels and aircraft in the ports of the contracting parties when loading materials for dumping. The basic thrust of the convention was to prohibit all dumping of wastes or other matter in the sea, with three categories of activities excluded. There was difficulty in formulation of the convention's Articles, but the regulatory provisions appeared relatively straightforward in the final draft. Great dependency was put on National Administrators and it was felt the Marine Protection, Research and Sanctuaries Act of 1972 would give greater meaning to the convention. Provisions were set forth for future institutional arrangements. The jurisdiction problem, the most contentious of the negotiations, was left more or less unanswered, however, all nations agreed action must be taken as soon as possible. Amendment procedures were also set up. (Sutton-Florida)
W74-04032

ESTUARIES UNDER ATTACK,
Oregon State Univ. Extension Service, Corvallis. Marine Advisory Program.
For primary bibliographic entry see Field 6G.
W74-04033

LEVELS OF ASSESSMENT,
Upper Mississippi River Basin Commission, Twin Cities, Minn.
For primary bibliographic entry see Field 6B.
W74-04035

WATER COMMISSION ENDORSES USER PAY CONCEPT,
Arkansas Wildlife Federation, Inc., Dardanelle.
For primary bibliographic entry see Field 6E.
W74-04036

DEVELOPMENTS IN WATER UTILITY LAW, 1972-1973, AMERICAN BAR ASSOCIATION REVIEW.
Journal American Water Works Association, Vol 65, No 11, p 690-699, November 1973. 1 tab.

Descriptors: *Legislation, *Water law, *Legal aspects, *Waste disposal, *Utilities, Pollution, *Pollution abatement, Planning, Environmental effects, Social aspects, Discharge, Waste water disposal, Profit return, Water pollution.

An overview is presented of recent legal developments relevant to the water utility industry. In 1972 Congress passed over the President's veto a 24.6 billion dollar Water Pollution Control Act to provide states and municipalities with sewage control funds for the next three years. The House of Representatives sustained Nixon's veto over the Rural Water and Waste Disposal Plant Program which would have authorized rural water and sewer systems. Now in the development stage is legislation on safe drinking water standards supported by the administration. Prosecutions for violations of the Refuse Act of 1899 have been stymied by a federal court's decision holding that until the Environmental Protection Agency establishes a permit-system prosecution for discharges will not be allowed. Congress has also passed a bill prohibiting dumping of waste and materials in the oceans, coastal waters and Great Lakes. The Supreme Court held Florida's strict no-fault liability Oil-Spill Prevention and Pollution Control Act valid. Various other actions and legislation of a statewide basis are reported including public service commission jurisdiction, rate bases, rate of return for public utilities, expenses, revenues, interim relief, and customer service and billing. (Silber-Florida)
W74-04037

TREATMENT OF HAZARDOUS MATERIAL SPILLS WITH FLOATING MASS TRANSFER MEDIA,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W74-04043

FABRIC BOOM CONCEPT FOR CONTAINMENT AND COLLECTION OF FLOATING OIL,
CONSULTEC, Rockville, Md.
P. E. Bonz.
Copy available from GPO Sup Doc as EP1.23:670/2-73-069, $1.00; microfiche from NTIS as PB-228 049 $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-069, September 1973. 63 p, 5 fig, 2 tab, 15 ref. EPA Project 15080 FWM. 68-01-0139.

Descriptors: *Water pollution control, *Oil spills, *Flow separation, Running waters, Fabrics, Feasibility study, Oil, Oil-water interfaces, *Oil pollution, Separation techniques, High flow, Pollution abatement.
Identifiers: Floating oil, Oil containment, Oil collection, *Oil boom, Hydrophilic fabric.

The feasibility of applying the concept of oil-water separation by means of woven hydrophilic fabric to a floating oil containment boom was investigated through a series of model tests. A preliminary model boom configuration was developed and towed at speeds to 0.686 meters/sec (2.25 ft/sec) in both calm water and waves. Oil retention performance of this model was clearly superior to that of a conventional flat plate boom of comparable draft in the environment investigated. A larger model of similar configuration demonstrated no oil leakage when towed at 0.77 meter/sec (1.5 kt) in calm water. While further detailed analysis, engineering, and testing is required to fully examine this concept, it appears that a properly designed flexible boom which uses a hydrophilic skirt material offers significant potential both as a containment device for floating oil in high current situations and as a high-speed collecting device. (EPA)
W74-04044

U-TUBE AERATION,
Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
For primary bibliographic entry see Field 5D.
W74-04046

THE IMPACT OF COSTS ASSOCIATED WITH NEW ENVIRONMENTAL STANDARDS UPON THE PETROLEUM REFINING INDUSTRY. PART II. STRUCTURE OF THE INDUSTRY.
Sobtoka (Stephen) and Co., New York.
For primary bibliographic entry see Field 3E.
W74-04076

THE ECONOMIC IMPACT OF POLLUTION CONTROL. AN OVERVIEW, A SUMMARY OF RESEARCH STUDIES.
Chase Econometric Associates, Inc., Philadelphia, Pa.
Available from the National Technical Information Service as PB-207 205, $3.75 in paper copy, $1.45 in microfiche. Prepared for Council on Environmental Quality, Washington, D.C., March 1972. 42 p, 1 tab.

Descriptors: *Pollution abatement, *Economic impact, *Industries, Water pollution control, Air pollution, Food processing industry, Oil industry, Pulp and paper industry, Baseline studies, *Cost analysis.
Identifiers: Automobiles, Baking, Cement, Electric power generation, Iron foundries, Leather tanning, Nonferrous metals, Smelting and refining, Petroleum refineries, Steel making.

Studies of the economic impacts of water and air pollution abatement requirements on various industrial activities are presented in an overview. The general findings of the micro- and macroeconomic impact studies are summarized and their concentration on adverse impacts is noted. The significant positive economic impacts that can also be expected include: increased profits and employment in pollution abatement equipment suppliers, and industries that produce low-pollution products; also more efficient firms will absorb the market shares left by marginal firm closures. In addition, specific and average productivity increases may occur as a result of technological innovations, closure of less efficient marginal firms, and the general economic benefits of a cleaner environment. The macroeconomic analysis was found to overstate the net costs to society due to the national accounting framework's neglect of the benefits of a cleaner environment. (Weaver-Wisconsin)
W74-04077

ECONOMIC IMPACT OF ANTICIPATED PAPER INDUSTRY POLLUTION-ABATEMENT COSTS. PART III. ECONOMIC ANALYSIS.
Little (Arthur D.), Inc., Cambridge, Mass.
Available from the National Technical Information Service as PB-207 146, $4.50 in paper copy, $1.45 in microfiche. Report to Council on Environmental Quality, November 1971. 72 p, 6 fig, 29 tab, 2 append.

Descriptors: *Pulp and paper industry, *Cost analysis, *Pollution abatement, *Economic impact, Capital costs, Operating costs, Unemployment, Regional economics, Waste water treatment, Biochemical oxygen demand, Suspended solids, Costs, Sulfite liquors, Waste treatment, Pulp wastes, Air pollution, Oregon, Prices, Foreign trade.
Identifiers: Product sector impact, Indirect economic impact, Supplier industries.

Specific dislocations of marginal paper mills and other changes anticipated as a result of the increased capital and operating costs the paper industry will face in meeting pollution control standards over the next five years are analyzed. Based on data reported by various public and private sources, specific capital and operating costs for water pollution controls applied to those product sectors of the industry which were expected to be most sensitive because of low tonnage production levels indicated a range from $8.00 to $25.00 per ton of product for normal operation with capital costs ranging from $16,000.00 to $51,000.00 per daily ton of capacity. Air pollution control was estimated to have an operating cost of $1.00 per ton of product and capital costs of $700.00 per daily ton of capacity. Financing of these costs is expected to occur by short-run price increases of 3.5% to 10% depending on the product sector. The tissue paper and special industrial paper product sectors will experience the greatest shut-down of marginal capacity with associated job losses, and indirect economic impacts are estimated on both a sectoral and regional basis. (See also W73-02941) (Weaver-Wisconsin)
W74-04078

AN INVESTMENT DECISION MODEL FOR CONTROL TECHNOLOGY,
National Environmental Research Center, Cincinnati, Ohio.
R. M. Clark.
Available from the National Technical Information Service as PB-213 482, $3.00 in paper copy, $1.45 in microfiche. Environmental Protection Agency, Socioeconomic Environmental Studies Series EPA-R5-72-004, September 1972. 20 p, 5 ref.

Descriptors: Investment, *Decision making, *Environmental control, Technology, *Mathematical models, Incineration, Waste disposal, Operating costs, *Capital costs, Financing, *Construction costs, Waste disposal, Treatment facilities.
Identifiers: *Investment decision model.

Investment decisions in control technology for environmental management are dependent on borrowing and lending variables. A mathematical model is constructed in which the investment decision is divided into two stages: the total operating and capital cost decision and the investment cost decision. Thus, an efficient method for both the definition of variables important to each decision and the coordination of expenditures with incoming funds is developed. The costs involved with each investment decision are minimized in two stages. The first stage utilizes a fixed-charge algorithm to minimize the total operating and capital cost of a facility subject to operational constraints. The second stage minimizes the cost of financing construction using a linear programming algorithm. Characteristic capital and cost functions and an investment cost dependent on the rate of return associated with the bonds used to finance the capital expenditures were assumed for an example incinerator project. (Weaver-Wisconsin)
W74-04079

THE EFFECTS OF POLLUTION CONTROL ON THE NONFERROUS METALS INDUSTRIES. COPPER. PART I. INTRODUCTION AND EXECUTIVE SUMMARY.
Charles River Associates, Inc., Cambridge, Mass.
Available from the National Technical Information Service as PB-207 161, $3.00 in paper copy, $1.45 in microfiche. Prepared for Council on Environmental Quality, Washington, D.C., December 1971. 21 p, 1 fig, 2 tab.

Descriptors: Copper, *Industries, *Pollution abatement, *Economic impact, Economic analysis, *Cost analysis.
Identifiers: *Copper industry, Price policies, Industrial organization, Demand and supply trends, Technological change.

A summary of the two succeeding parts of this report gives a broad profile of the copper industry and an outline of the economic effects of pollution controls on the industry. An overview of the copper market and trends in production and consumption indicate that the United States is by far the largest consumer of copper and that its demand is subject to irregular fluctuations. Because ingot makers can alter proportions of metals in alloys, copper is subject to some short-run substitution which occurs most often with aluminum. The principal source of pollution in copper production occurs at the point of smelting where sulfur dioxide is emitted to the air. Water pollution problems arise in electrolyic refining. The world primary copper industry is highly concentrated with a high degree of vertical integration. Copper prices, government policies, and the industry's history are reviewed. Most important among the effects of abatement costs is a possible shift of smelting to foreign operations if abatement costs exceed $0.02 - $0.04 per pound. No long-run declines in employment are expected although Arizona is the most likely to be affected adversely by pollution abatement costs. (See also W74-04082) (Weaver-Wisconsin)
W74-04081

THE EFFECTS OF POLLUTION CONTROL ON THE NONFERROUS METALS INDUSTRIES. COPPER. PART II. STRUCTURE OF THE INDUSTRY.
Charles River Associates, Inc., Cambridge, Mass.
Available from the National Technical Information Service as PB-207 162, $5.45 in paper copy, $1.45 in microfiche. Submitted to Council on Environmental Quality, Washington, D.C., December 1971. 129 p, 4 fig, 22 tab.

Descriptors: *Economic impact, *Industries, Copper, Structure, Distribution, Geographic regions, Technology, Foreign trade, Prices, Federal government, *Arizona, *Pricing.
Identifiers: *Copper industry, Financial performance, *Industrial organization, Product supply trends.

In order to evaluate the effects of various anti-pollution measures, this second part of a three-part study of the copper industry describes the primary and secondary industries, geographic distribution of world copper production, mining and smelting production in the United States and the technology of mining, milling, smelting, and refining. Product consumption including refined copper, scrap, copper alloy, and ingot; end uses of copper; substitutions; and international trade patterns are discussed. The industry is structured on concentration, vertical organization, physical distribution, and conditions of entry. Pricing of copper is described by its price history, refined copper quotations, a model of the copper market, econometric estimates on price and 'income' elasticities of demand. The most important refined copper prices in the United States are the 'domestic producer price' and the 'custom smelter price.' Government policies include the copper stockpile program, trade policies, and price controls. A description of the domestic distribution of the industry includes mining, smelting, refining, employment, copper producing areas (particularly Arizona), other copper smelting states, and the financial performance of the United States industry. (See also W74-04081) (Auen-Wisconsin)
W74-04082

SOME MODELS FOR THE ECONOMIC EVALUATION OF THE ENVIRONMENT,
Netherlands School of Economics, Rotterdam.
P. Nijkamp, and J. Paelinck.
Regional and Urban Economics, Vol 3, No 1, p 33-62, 1973. 1 fig, 1 tab, 12 ref.

Descriptors: Environment, *Evaluation, *Social aspects, *Environmental control, Theoretical analysis, Welfare(Economics), Expenditures, Decision making, Future planning(Projected), Mathematical studies, Gross National Product, Dynamic programming, Resource allocation.
Identifiers: *Environmental quality, Implicit preference functions, Environmental expenditures, *Belgium.

The rise in the prosperity of industrial nations has become concomitant with changes in the environment and with resulting demands that the environment be preserved. Three models are given which attempt to recognize the existence of and changes in environmental preferences. A static model is first presented which uses an implicit preference function to estimate parameters that influence the intertemporal allocation of scarce resources between the environment and all other goods. The model, applied to 1953-69 Belgian data, shows a rise in relative preferences in favor of environment. The second model stands primarily as a transitional step to the third. It introduces time as a variable and suggests some implications on the evolution of welfare given hypotheses related to the evolution of relative preferences. The third model places environmental priorities in a dynamic context to aid in the study of the consequences of environmental policy. Techniques of optimal control are applied in order to solve optimal environmental policy for all respective values of the state variables. (Schroeder-Wisconsin)
W74-04083

EXTERNALITIES, ENVIRONMENTAL POLLUTION AND ALLOCATION IN SPACE: A GENERAL EQUILIBRIUM APPROACH,
Oslo Univ. (Norway). Inst. of Economics.
F. R. Forsund.
Regional and Urban Economics, Vol 3, No 1, p 3-32, 1973. 29 ref.

Descriptors: *Model studies, *Resource allocation, *Indirect costs, *Spatial distribution, Environment, Air pollution, Water pollution, Waste assimilative capacity, Welfare(Economics), Decision making.
Identifiers: *General equilibrium analysis, Environmental economics, Environmental pollution, *Externalities.

Allocation rules relevant within a setting of major interdependencies between man's economic activities and their effects and interaction on the natural environment are restated in order to emphasize their basis in the economic analysis and treatment of externalities. The model assumes that economic activities produce certain residuals which are received by Nature. These recipients provide two types of services to man: residual disposal and environmental activities such as recreation, and resource extraction. The effect of residual production is to reduce the level of environmental services provided by the recipient. A static general equilibrium analysis is used to consider the trade-offs involved in rational decision-making and thus, derive the first-order conditions for Paretooptimal resource allocation. The possible existence of a decentralized linear pricing system to achieve the identified optimal solution is also considered. (Weaver-Wisconsin)
W74-04084

ECONOMIC AND SOCIAL PROJECTS WITH ENVIRONMENTAL REPERCUSSIONS: A SHADOW PROJECT APPROACH,
Netherlands School of Economics, Rotterdam.
For primary bibliographic entry see Field 6B.
W74-04085

THE ENVIRONMENTAL COST OF ECONOMIC GROWTH,
Washington Univ., St. Louis, Mo. Center for the Biology of Natural Systems.
B. Commoner.

In: Energy, Economic Growth and the Environment, Forum conducted by Resources for the Future, Inc., April 20-21, 1971, Washington, D.C., p 30-65. (1971). 13 fig, 9 tab.

Descriptors: *Gross National Product, Technology, *Ecology, *Economic impact, Environmental effects, Natural resources, Human population, Pollutants, Industrial production, United States.
Identifiers: *Economic growth, *Environmental costs.

The primary element of the ecosphere is the ecological cycle. In itself, the cycle is self-governing, maintaining a relatively steady state over time, unless stressed by an external agent. The economic system, which rations scarce resources, is highly dependent upon the stability of the ecosystem. For its own stability, however, the economic system is required to grow by increasingly extracting wealth from the ecosystem, reducing the system's ability to regenerate itself. Data summarized indicate that since 1946 emissions of pollutants have increased by 200-2000%. The hypothesis is that the size of the population, production or consumption per capita, and new technology has significantly increased pollutants. It is approximated that while population accounts for 40% of the increase, postwar technology has been the chief reason for the environmental crisis. The effects of this technical change is illustrated in agricultural production, textiles, manufacturing, detergents, packaging, and automobiles. There is a need for environmental impact inventories to examine the relationship between production, consumption, and waste disposal decisions. (Schroeder-Wisconsin)
W74-04088

AERATION AT WEIRS.
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 5C.
W74-04113

GENERALIZED SIMULATION MODELS FOR MASSACHUSETTS STREAMS,
Quirk, Lawler and Matusky Engineers, Tappan, N.Y.
For primary bibliographic entry see Field 5B.
W74-04118

HYGIENIC EVALUATION OF A MACHINE FOR APPLYING GRANULATED HERBICIDES IN CANALS OF THE COLLECTOR-DRAINAGE NETWORK, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
V. S. Buryi, V. A. Zakordonets, A. T. Goshka, S. N. Kudevich, and D. Kh. Babakulyev.
Zdravookhr Turkm. Vol 15, No 12, p 39-40. 1971.
Identifiers: Air pollution, Canals(Collector), Diuron, Drainage networks, Granulated, *Herbicides, *Hygienic evaluation, Occupations, Public health.

Data are given on the average content of diuron in the air of the working zone of the SV-2.5 machine used for applying granulated herbicides to rid canals of vegetation. The content did not exceed the maximum allowable concentration (8 mg/m3).--Copyright 1973, Biological Abstracts, Inc.
W74-04166

DISPOSAL OF RADIOACTIVE WASTES INTO THE UNDERGROUND IN THE FEDERAL REPUBLIC OF GERMANY - A SURVEY ON PRACTICAL EXPERIENCE AND R AND D WORK,
Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).
For primary bibliographic entry see Field 5E.
W74-04171

IMPROVING WATER QUALITY MANAGEMENT PLANNING IN NONMETROPOLITAN AREAS.
National Area Development Inst. of Spindletop Research Inc., Lexington, Ky.
Superintendent of Documents, U.S. GPO, Wash., DC 20402 $0.95. Environmental Protection Agency Report EPA 68-01-0194, January 1973, 75p.

Descriptors: Federal project policy, Federal jurisdiction, *Governmental interrelations, Institutions, *Planning, *Management, *Water quality standards, Regulation, *Rural areas, Administration, Legislation, Legal aspects, *State governments, *Coordination, *Interagency cooperation.
Identifiers: *Nonmetropolitan area wide planning.

The findings and recommendations set forth are based on a field survey of three states, interviews with officials of EPA, HUD, EDA and FHA, and observations made by the project team in connection with other research and related activity in support of nonmetropolitan area development. The research focused on the four agencies' programs related to water quality management planning, EPA's planning guidelines, the EPA-HUD Joint Agreement on unified planning requirements and other attempts to devise a coordinated approach. Needs of nonmetropolitan areas to cope with both urban-type pollution problems and nonpoint sources peculiar to the rural setting were analyzed in terms of the capabilities of existing emerging institutions. It is concluded that because of the diverse situations which exist in nonmetropolitan areas, a coordinative planning approach focused at the substate district level would be more effective than an approach which places primary reliance on Federal level interagency agreements on detailed uniform planning requirements.
W74-04199

THE ENVIRONMENTAL AND REGULATORY ASPECTS OF THE BREEDER REACTOR,
Atomic Energy Commission Washington, D.C.
For primary bibliographic entry see Field 5B.
W74-04238

EFFECTS OF THE FEEDER CANAL ON THE WATER RESOURCES OF THE FORT LAUDERDALE PROSPECT WELL-FIELD AREA,
Geological Survey, Miami, Fla.
J. McCoy.
Open-file report 73019, April 1973. 24 p, 12 fig, 2 tab.

Descriptors: *Water quality control, *Groundwater resources, *Saline water intrusion, *Florida, Water pollution control, Methodology, Dredging, Canals, Groundwater recharge, Water table, Water levels, Hydrologic data, Data collections, Water wells, Aquifer characteristics, Groundwater movement.
Identifiers: *Fort Lauderdale(Fla), *Aquifer feeder canal.

Ever-increasing water demands of the rapidly growing Fort Lauderdale, Florida, area have required water managers to use expedient means for not only increasing the amount of freshwater for use but also for protecting the freshwater source from saltwater contamination. A Feeder Canal was dredged to increase recharge to the Biscayne aquifer in the vicinity of the Prospect well field. Freshwater is conveyed into the Feeder Canal from the perimeter canals of an inland water-conservation area by way of Middle River Canal. The Feeder Canal runs from the controlled reach of the Middle River Canal, along the south part of the Prospect well field, then back into the tidal reach of the Middle River Canal. Flow in the lower reach of the Feeder Canal is regulated by a control structure near Powerline Road. Comparison of water-level contour maps of the well field area before and after dredging of the Feeder Canal indicated that the canal has raised water levels in the southwest part of the well-field area. During the latter part of the 1970-71 drought, the canal probably contributed about 3 million gallons of water a day to the Biscayne aquifer. (Woodard-USGS)
W74-04259

WATER QUALITY CYCLE--REFLECTION OF ACTIVITIES OF NATURE AND MAN,
California State Dept. of Water Resources, Los Agneles. Southern District.
For primary bibliographic entry see Field 5B.
W74-04263

WAT'S NEW IN DEEP-WELL INJECTION,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 5E.
W74-04265

PROTECTION OF SAPROPHYTES AS THE MAIN FACTOR IN A PROGRAM FOR PROTECTION OF WATER ENVIRONMENTS, (IN POLISH),
Polskie Towarzystwo Przyrodnikow im. Kopernika, Warsaw.
E. Kocwowa.
Wszechswiat. 9, p 238-240. 1972.
Identifiers: *Bacteria, Environmental protection, *Saprophytes, *Water pollution, *Self-purification.

The importance of cooperation between technologists, biologists, hydrobiologists, microbiologists, biochemists and toxicologists in solving the problem of water pollution is discussed. The role of bacteria in self-purification of waters is presented with special emphasis on the following forms of microorganisms: proteolytic, amylolytic, pectolytic, lulolytic, sacharolytic and lipolytic. Other types of microorganisms are also dealt with. A number of postulates which should be taken into consideration in water purification programs are listed.--Copyright 1973, Biological Abstracts, Inc.
W74-04297

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

THE OPTIMAL EXPANSION OF A WATER RESOURCES SYSTEMS,
Texas Univ., Austin. Dept. of Chemical Engineering.
D. M. Himmelblau.
Availability from NTIS as PB-227 335 $4.75 in paper copy, $1.45 in microfiche. Final Technical Report, August 13, 1973. 131 p, 9 fig, 5 tab, 39 ref, append. OWRR C-3020(No 3673)(2).

Descriptors: *Water policy, *Decision making, *Optimization, *Systems analysis, Digital computers,*Regional analysis, *Computer programs, Water resources development, Analytical techniques, Mathematical models, Project planning.

One approach to the planning for a comprehensive water resources system is discussed together with the criteria used to evaluate the expansion of an existing water resources system. A model of a river basin that includes a number of possible dam sites available for future regulation of water, deterministic inputs, a network configuration, linear constraints, and capital investment and operating decisions made on a yearly basis was set up so that the operating policy and construction policy could be determined by optimization of an objective function. The system model does not include stochastic effects nor intangible benefits and costs. The optimization strategy includes the

branch and bound method together with the out-of-kilter algorithm. The objective function is maximized over the set of alternative projects to give the sum of discounted present value of the net earnings of the system subject to water demands and various institutional, physical and budgetary limits. An example problem is solved and computer programs are listed together with appropriate documentation.
W74-03754

AN APPLICATION STUDY IN WATER DISTRIBUTION CONTROL,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 8C.
W74-03755

ALTERNATIVE FUTURES USING THE WOLLMAN-BONEM MODELS,
University of Southwestern Louisiana, Lafayette. Dept. of Statistics.
J. W. McFarland, and M. L. Hyatt.
Water Resources Bulletin, Vol 9, No 4, p 755-767, 1973. 8 fig, 9 ref.

Descriptors: Water supply, *Dynamic programing, *Water demand, Water reuse, *Water consumption, Forecasting, Water quality, Model studies, *Alternative planning.
Identifiers: *Wollman-Bonem model, Alternative futures, Sensitivity analysis.

The Wollman-Bonem model is used to predict the direction and relative magnitude of quantitative and qualitative changes in water use which occur over time and as a result of changes in technology or policy. The need to examine a number of alternative assumptions of demographic-economic growth which would yield a range rather than a point prediction is argued. For 22 regions, projections of water-using activities were made and multiplied by use coefficients to obtain future water demand for agriculture, mining, manufacturing, steam-electric and municipal users in 1980, 2000, 2020. The basic run of the model revealed withdrawal increases of 1.5 to 6 times by 2020, with steam-electric plants and agriculture the greatest consumers. Recycling could reduce withdrawals by nearly 75 percent by 2000 for electric plants. BOD wastes were projected to increase by 4 to 7 times, with industrial sources containing to be the largest contributors. A 50 percent increase in costs is estimated when quality parameters were raised from 4 to 6 mg/l dissolved oxygen. The basic run also shows water deficiencies arising in 5-16 of the 22 regions by 2020. (Schroeder-Wisconsin)
W74-03888

SYSTEMS SIMULATION OF ECONOMIC FACTORS AND THEIR RELATION TO THE WATER SYSTEM OF WYOMING'S PLATTE RIVER BASIN,
Wyoming Univ., Laramie. Water Resources Research Inst.
C. Phillips.
Available from the National Technical Information Service as PB-227 267; $3.75 in paper copy, $1.45 in microfiche. Water Resources Series No. 40, November 1973. 45 p, 18 fig, 2 append. OWRR A-005-WYO(1).

Descriptors: *Wyoming, Model studies, *Simulation analysis, Hydrologic models, *River basin development, System analysis, Planning, Regional analysis, Costs.
Identifiers: *Platte River basin(Wyo), *Economic models.

That portion of Wyoming within the North Platte River Basin is likely to feel substantial pressure for development in the next decade. The availability and cost of water will be important considerations in future development plans for this area. The present economic structure of the Basin has been strongly influenced by existing water development projects. Future efforts to develop additional water supplies will be evaluated in terms of the benefits and costs associated with new and expanded growth opportunities, as well as the beneficial and detrimental impacts that will be imposed on the existing environmental and economic structure of the Basin. This study examines the potential for designing an economic model of the Basin, using simulation techniques of analysis, for use in evaluating development impacts that are likely to occur in the near future. A hydrologic model of the Basin is also being developed using simulation techniques, and it is intended that the two models will eventually be integrated.
W74-03892

GROUND-WATER HYDRAULICS IN AQUIFER MANAGEMENT,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-03913

SEQUENTIAL STOCHASTIC OPTIMIZATION FOR RESERVOIR SYSTEM,
Iowa Univ., Iowa City. Inst. of Hydraulic Research.
For primary bibliographic entry see Field 4A.
W74-03914

UNCERTAINTIES IN HYDROLOGIC MODELS,
Arizona Univ., Tucson. Dept. of Hydrology and Water Resources.
For primary bibliographic entry see Field 2A.
W74-03916

FLORIDA WATER RESOURCES ACT OF 1972.
Fla. Stat., sec. 373.013 to 373.201 (Supp. 1972).

Descriptors: *Florida, *Planning, *Legislation, *Water conservation, *Water law, Water pollution, Permits, Water resources planning act, Subsurface water, Surface water, Flood control, Drainage, Land managemnt, regulation, Saline water intrusion, Water utilization.
Identifiers: *Administrative regulations, *Florida Water Resources Act.

The act declares the policy to the legislature to manage, conserve, develop, and utilize the state's water resources. All waters in the state are subject to this regulation unless they are specifically exempted. The Florida department of natural resources has power to do research and investigations into all aspects of water use and water quality, and to conduct a continuing study of those areas of the state where saltwater intrusion is a threat to freshwater resources. The department also has the responsibility of formulating a state water use plan in which consideration will be given to: (1) the maximum beneficial use of water; (2) environmental protection, drainage, flood control, and water storage; and (3) the prevention of wasteful water uses. When any change is made in the state water use plan, public notice followed by a hearing is required. The statute creates five regional water management districts which are under the control of the department of natural resources. The act sets forth all of the administrative, procedural and judicial requirements necessary to implement the act. (Sperling-Florida)
W74-04019

COST ANALYSIS OF OPTIONAL METHODS OF SHIPBOARD DOMESTIC WASTE DISPOSAL,
For primary bibliographic entry see Field 5D.
W74-04115

DESIGN AND COST ALLOCATION ALGORITHM FOR WASTE TREATMENT SYSTEMS,
Thayer School of Engineering, Hanover, N.H.
For primary bibliographic entry see Field 5D.
W74-04116

WATER-SUPPLY PLANNING IN DEVELOPING COUNTRIES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
D. T. Lauria.
Journal American Water Works Association, Vol 65, No 9, Part I, p 583-587, September 1973. 5 fig, 11 ref.

Descriptors: *Water supply, *Planning, *Water resources development, United States, *Economic efficiency, Benefits, Costs, Economies of scale, Mathematical models, Systems analysis, Design, Construction, Timing, Research, Regional analysis.
Identifiers: *Developing countries, Excess capacity, Mixed-integer programming, *Regional planning.

An overview is presented of the most fundamental water supply planning problems in developing countries. Considered are those United States water supply planning approaches which are applicable in such countries, and those which are not. The amount of excess capacity that should be provided in a particular water supply system is largely a function of economies of scale and the discount rate; thus, U.S. design-period standards should not be used abroad. Construction timing depends upon the tension between implementation costs and the value of publicly supplied water. Regional planning is required abroad because of the need to allocate national water-sector budgets. Regional planning, mixed-integer programming models developed to solve the budget-allocation problem are discussed. Planning for economic efficiency requires data on water supply benefits. To obtain such information: (1) Studies can be made for measuring benefits in pertinent markets such as labor, and the water market itself; (2) benefits can be set by value judgment and political fiat; and (3) benefits can be imputed. Much research and improved regional planning models are needed to better water supply planning in developing countries. Studies should be conducted abroad to obtain information on water supply benefits. (Bell-Cornell)
W74-04117

GENERALIZED SIMULATION MODELS FOR MASSACHUSETTS STREAMS,
Quirk, Lawler and Matusky Engineers, Tappan, N.Y.
For primary bibliographic entry see Field 5B.
W74-04118

COMPUTER-ASSISTED ACTIVATED SLUDGE PLANT OPERATION,
Ottawa Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-04119

A SOCIAL REPORT - MAN AND WATER, THE RELATIONSHIP BETWEEN SOCIAL PSYCHOLOGICAL SYSTEMS AND WATER RESOURCES DEVELOPMENT,
Abt Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W74-04170

WATER-MANAGEMENT STUDIES OF A STREAM-AQUIFER SYSTEM, ARKANSAS RIVER VALLEY, COLORADO,
Geological Survey, Pueblo, Colo.
For primary bibliographic entry see Field 4B.
W74-04262

6B. Evaluation Process

COMMUNITY WELL-BEING AS A FACTOR IN URBAN LAND USE PLANNING,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
L. D. James, D. R. Brogan, E. A. Laurent, and H. E. Baltimore.
Availability from NTIS as PB-227 339 $6.00 in paper copy, $1.45 in microfiche. Partial Completion Report No ERC-0174, January 1974, 218 p, 10 fig, 31 tab, 141 ref, 4 append. OWRR C-2064(No 3359)(1). 14-31-0001-3359.

Descriptors: *Georgia, *Social aspects, Area redevelopment, *Project planning, Aesthetics, Landscaping, *Urban sociology, Environment, Psychological aspects, Human behavior, Nonstructural alternatives, Flood plain zoning, *Urban renewal, Urbanization, *Land use, Scenery, Law enforcement.
Identifiers: Crime, Social discord, Mental health, *Atlanta(Geo).

Many engineers, planners, sociologists, psychologists, and architects recognize that the well-being of residents of an urban community may be profoundly affected by the designs used for transportation, drainage, communication and other urban facilities. A better understanding of how the well-being of people living in an urban community relates to the physical features of their residential environment is important both to planners who desire to minimize any potential adverse effects from their design and professionals (primarily in mental health and law enforcement) who must deal with the problems symptomatic of a low level of well-being. Annual totals of 22 such symptoms were summed for 100 Atlanta city blocks. Also measured for each block were 116 physical characteristics, such as landscaping and nearby land use, and 106 social characteristics, such as population density and income. While the establishment of casual relationships was beyond the scope of this study, the associations developed by regression analysis demonstrated that physical characteristics are roughly as important as social characteristics in explaining well-being problems. Some problems are better explained by physical while others are better explained by social characteristics. The primary relationship is that physical features that attract many outsiders accentuate well-being problems in a residential community while those that isolate a community minimize such problems. Flood plain land uses can either attract or provide a protective barrier against adverse outside influences.
W74-03751

ALASKA WATER RESOURCES RESEARCH NEEDS FOR THE 70'S.
Alaska Univ., College. Inst. of Water Resources.
Availability from NTIS as PB-227 244 $4.75 in paper copy, $1.45 in microfiche. Report No IWR-39, September, 1973, 155 p. (Edited by R. F. Carlson and J. Butler). OWRR A-038-ALAS(1).

Descriptors: Water policy, Water law, Lakes, *Alaska, Hydrology, Limnology, Groundwater, *Management, Snow, Ice, *Water quality, Sanitary engineering, Cold regions, *Research and development, Applied research, Basic research, *Resources development, Administration, Research priorities, Planning.
Identifiers: *Research needs.

The Institute sponsored a seminar which examined the water resources research needs for the state during the next decade. The seminar brought together as speakers and participants: public and private users, state and federal regulatory bodies, consulting engineers, researchers and interested citizens. The seminar proceedings presents the remarks of 16 speakers who discussed topics in water quality, water resources control, resources development and resources administrations. Also included in the report are a keynote address, concluding remarks, a report of the Institute's advisory board meeting held the following day, and summary of the whole research examination effort. Research recommendations are given for the areas of water resource management aspect of fisheries management, recreational lakes, reservoir management, flood control, water resource management in cold climates, and urban water resource management.
W74-03757

PRELIMINARY INDICATORS OF INCOME/WEALTH REDISTRIBUTION ASSOCIATED WITH BUREAU OF RECLAMATION PROJECTS,
Utah State Univ., Logan. Dept. of Economics.
R. Willis, A. LeBaron, and H. Fullerton.
Available from the National Technical Information Service as PB-227 243; $3.25 in paper copy, $1.45 in microfiche. Utah Water Research Laboratory, Utah State University, Logan, Completion Report PRCWRR816-1, October 1973. 32 p, 8 fig, 17 tab, 37 ref. OWRR B-049-UTAH(2). 14-31-0001-3342.

Descriptors: *Income distributions, *Supplemental irrigation, *Utah, *Colorado, *Welfare(Economics), Income analysis.
Identifiers: *Bureau of Reclamation projects, Wealth, Economic well-being, Lorenz curves.

Social well being is an accepted subset of water investment feasibility criteria. The purpose of this study was to isolate income redistribution impacts conferred by the U.S. Bureau of Reclamation projects. Four project sites have been utilized to yield both pre and post project estimates of farm income and wealth. Production functions of the Cobb-Douglas type were estimated to yield information about factor shares, and thus enable inferences to be made about distribution of total product among the factors, which can be reduced to show changes in income/wealth distributions. Lorenz curves were developed to show changes in distribution of wealth and net income in terms of family enterprise, per acre, and per irrigated acre. Listing of individual farmers income and wealth measures are included to show movements (from-to) from pre to post project time periods. Results tend to confirm the hypothesis that larger farmers (in terms of acreage) tend to benefit in absolute terms more than smaller farmers; however, relative changes (measured in terms of per irrigated acre) show the small farmer benefiting from a project more than does the large farmer. Over 80 percent of the farm families studied shifted into higher or lower income categories (50 percent up, 50 percent down) following project implementation. About 80 percent of the farm families in the sample changed positions (75 percent up, 25 percent down) in terms of the wealth measures.
W74-03771

APPLICATION OF STATISTICAL METHODS IN HYDROLOGY (PRIMENENIYE STATISTICHESKIKH METODOV V GIDROLOGII).
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Gosudarstvennyy Gidrologicheskiy Institut Trudy, No 196, G. A. Alekseyev, and A. V. Rozhdestvenskiy, editors, Leningrad, 1973. 267 p.

Descriptors: *Hydrology, *Hydrologic data, *Statistical methods, *Model studies, Correlation analysis, Regression analysis, Time series analysis, Discharge(Water), Runoff, Streamflow, Low flow, Forecasting, Probability, Markov processes, Statistical models, Variability, Fluctuations, Meteorology, Maps, Curves, Equations.
Identifiers: *USSR.

Statistical procedures useful in hydrology and statistical characteristics of hydrologic data are examined in this collection of 14 papers published by the Leningrad State Hydrologic Institute. Statistical procedures and characteristics examined include statistical modeling of time series; estimation of homogeneity of statistical series and stability of their parameters; conformity of theoretical and empirical probability distribution curves; optimal spatial interpolation of precipitation and estimation of errors; use of multiple correlation in low-flow computations and in forecasts of minimum groundwater levels; and analysis of time correlation functions of annual runoff in the USSR. A mathematical description is given of thermal characteristics in deep bodies of water. (Josefson-USGS)
W74-03831

AN INDUSTRIAL POLLUTION INDEX,
Winthrop Coll., Rock Hill, S.C. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-03889

NATIONAL WATER COMMISSION REPORTS.
Civil Engineering, ASCE (American Society of Civil Engineers), Vol 43, No 5, p 70-73, 1973. 2 fig, 3 tab.

Descriptors: *National Water Commission, Irrigation, Flood control, Water demand, Water distribution, Prices, Treatment facilities, Coastal areas, Recreation waste, Navigation, *Federal Government, State Government, *Regulation.
Identifiers: *National Environmental Policy Act, User charges.

The National Water Commission indicates support for the recently eroded National Environmental Policy Act. The act stresses the need for regional planning in water use projects, to balance conflicting interests over existing open space development. Criticism is levied, however, against use of the act to stop construction. The built-in opportunity for delay in development decisions is also criticized. The Commission approves the concept of one-stop licensing rather than the existing multi-agency approach. The Commission recommends that user charges be imposed on direct beneficiaries of water development projects, flood control projects and inland navigation, to cover costs. This requirement should be waived for the construction of waste treatment plants, recreation, fish and wildlife, and the coastal zones and estuaries. The Commission also recommends dropping prohibitions of inter-basin water transfer studies in the West, reexamination of existing rural-urban inequities in federal water programs and a realignment of governmental responsibilities. The federal government should take the lead in data collection, basic research and water transportation facilities; the state in controlling and preserving their own water resources. (Schroeder-Wisconsin)
W74-03890

SOCIAL ACCOUNTING APPROACHES TO WATER RESOURCE USE IN ECONOMIC DEVELOPMENT.
Auburn Univ., Ala. Water Resources Research Inst.
Available from the National Technical Information Service as PB-227 472; $8.75 in paper copy, $1.45 in microfiche. OWRR B-029-ALA(3).

Descriptors: *Economic impact, Water resources, *Social values, Model studies, Commercial fishing, Water pollution, *Regional development, Thermal pollution, Hydroelectric plants, Mercury, *Alabama, Input-output analysis, Graphical analysis, *Water utilization, Costs.
Identifiers: *Externalities, Opportunity costs, Russell-Spofford model, Social costs.

This collection of articles emphasizes the value of determining the costs associated with water-borne

externalities. Pecuniary, technical, marginal and inframarginal externalities are first defined and their effects on societies' production possibilities are examined. It is suggested that society can be the recipient of a 'free lunch' when technical externalities are accounted for. This concept is illustrated by showing economic gains which can be had without increased expenditures by separating antagonistic enterprises, or altering the location of industrial plants on a stream, and combining differing streams of societal effluent. A survey was made to determine the loss of commercial fishing income arising from a fishing ban on an Alabama lake caused by mercury pollution. Total income loss to fishermen was mitigated by shifting their resources to other uses; as a result, it appears that only 15 commercial fishermen suffered income losses. The effect of production, consumption and disposal decisions on level and form of residuals was also examined. The modeling effort illustrates the flow of residuals and costs arising from power generation from either coal or nuclear fuel. The effect of water quality on regional growth was examined using an input-output model. A decrease in usable water was traced to show its composite effect on income, consumption, and governmental expenditures and revenues. (See W74-03908 thru W74-03912) (Schroeder-Wisconsin)
W74-03907

CONCEPTS OF EXTERNALITIES AND SOCIAL COSTS,
Auburn Univ., Ala. Dept. of Economics.
M. M. Baker, M. Eckert, J. H. Blackstone, Jr., and D. R. Street.
In: Social Accounting Approaches to Water Resource Use in Economic Development, Auburn Univ., Alabama, School of Business Research Series 3, p 3-10, August 1972. 1 fig, 2 ref.

Descriptors: *Social impact, Planning, Economic efficiency, Welfare(Economics), *Costs, Pollution.
Identifiers: *Externalities, Technological externalities, Pecuniary externalities, Marginal externalities, Inframarginal externalities, *Social costs.

Private pollution costs paid by individual consumers and producers deviate from the costs imposed on society. Knowledge of this divergence has prompted society to ask for governmental intervention. According to economic theory, proper responses are based on knowledge of the kind of externality involved. Alternative external effects and their impact on proper governmental responses are defined. Pecuniary externalities do not change the production possibilities of a society and arise from competition within the market. Such externalities pose few efficiency questions but do affect income distributions. Technological externalities affect the production possibilities of a society and prevent efficient production. Marginal externalities cause changes in the production or cost of one firm, given a marginal change in the activity of the second firm. Inframarginal externalities are externalities or diseconomies which may cause changes in total production or cost in a firm given changes in the activities in a second, even though marginal changes in the second firm's activities may not create changes in the first firm's production or cost. Typically, government intervention is justified by efficiency criteria only under conditions of technological externalities. (See also W74-03907) (Schroeder-Wisconsin)
W74-03908

OPPORTUNITY COSTS AND WATER RESOURCE USE,
Auburn Univ., Ala. Dept. of Economics.
D. R. Street.
In: Social Accounting Approaches to Water Resource Use in Economic Development, Auburn Univ., Alabama, School of Business Research Series 3, p 11-18, August 1972. 1 fig, 4 ref.

Descriptors: *Economic efficiency, *Graphical analysis, *Welfare(Economics), Optimum development plans, *Water resources, Recycling, Salvage value, *Water utilization.
Identifiers: *Technological externalities, Edgeworth-Bowley trading box, Production possibility curve.

There exists a counter argument to the proposition that there is no such thing as a 'free lunch,' which is useful in analyzing externality problems in water resource use. A 'free lunch' is defined as a net increase in economic welfare resulting from a Pareto optimal rearrangement of resources, products or services from the status quo. The existence of a 'free lunch' is first illustrated using an Edgeworth-Bowley trading box, where each bargainer benefits as a result of the exchange. Net increases in welfare can also be derived from redirection of resources, services and products when externalities exist through reduction of damages, reduction of production costs, or transformation of negative externalities into positive factors. Net benefits are shown in three cases involving externalities. The first illustrates benefits from separation of antagonistic enterprises; the second shows benefits arising from alternative orderings of enterprises on water bodies; and the third shows benefits arising from alternative groupings of different wastes. (See also W74-03907) (Schroeder-Wisconsin)
W74-03909

THE ECONOMIC IMPACT OF THE BAN ON COMMERCIAL FISHING ON LAKE PICKWICK,
Auburn Univ., Ala. Dept. of Economics.
J. W. Granade.
In: Social Accounting Approaches to Water Resource Use in Economic Development, Auburn Univ., Alabama, School of Business Research Series 3, p 19-40, August 1972. 10 tab, 9 ref.

Descriptors: *Economic impact, *Commercial fishing, *Water pollution effects, *Costs, Measurement, Mercury, Income, *Alabama.
Identifiers: *Pickwick Lake(Ala).

In 1970 commercial fishing was banned at Lake Pickwick in Colbert and Lauderdale Counties, Alabama, after traces of mercury exceeding FDA standards were found. A study was conducted to measure an element of social cost generated by mercury pollution as commercial fishermen income loss. The total income loss must be assuaged by the transfer of resources to alternative uses to obtain the net loss of fishermen's income. An attempt by mail questionnaires and personal interviews was made to contact the 181 fishermen in the two counties holding commercial licenses. The 81 respondents fished three lakes, Pickwick, Wilson and Wheeler with a majority (44) fishing Pickwick. Of those fishing for income, a total loss of $3911/month, $475/month, and $145/month for the three lakes resulted from the ban. While data was insufficient to measure the effect of transferring resources, only 15 fishermen reported decreases in their income after the ban. The study assumed that the labor of 19 men over 50 was nontransferrable. (See also W74-03907) (Schroeder-Wisconsin)
W74-03910

RESIDUAL INFORMATION MODEL WITH APPLICATION TO HEAT FROM THERMAL POWER PLANTS,
Auburn Univ., Ala. Dept. of Economics.
For primary bibliographic entry see Field 5B.
W74-03911

REGIONAL INTERDEPENDENCIES AND EXTERNAL DISECONOMIES,
Auburn Univ., Ala. Dept. of Economics.
M. M. Baker, M. M. Yarbrough, and D. R. Street.
In: Social Accounting Approaches to Water Resource Use in Economic Development, Auburn Univ., Alabama, School of Business Research Series 3, p 90-112, August 1972. 8 fig, 2 tab, 1 append, 7 ref.

Descriptors: *Water pollution effects, *Regional economics, *Income analysis, Employment, Planning, Input-output analysis, *Water utilization.
Identifiers: *External diseconomies.

While the quantity of available water has not generally represented a constraint on growth in the United States, changes in water quality have become a critical factor in regional growth and stability. The effects of pollution on regional income and employment are examined. A simplified input-output model, including water-using and non-water-using industries, and the final demand sector are constructed. A decrease in usable water because of increased pollution is verbally traced through the matrix to show the direct and indirect effects on household income, consumption, and output and input decisions of regional industries. It is also suggested that public sector decisions will be affected because of changes in regional income and reduction of public facilities. Numerical examples are not given, however, to show the actual components of the matrix. An introduction to the basic identities of an input-output table is presented to facilitate the explanation and interpretation of income effects. (See also W74-03907) (Schroeder-Wisconsin)
W74-03912

WATER RESOURCES AND SOCIAL CHOICES,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
R. Burke, III, J. P. Heaney, and E. E. Pyatt.
Water Resources Bulletin, Vol 9, No 3, p 433-447, 1973. 5 fig, 30 ref. NSF GK-30829.

Descriptors: *Decision making, *Social participation, *Planning, Model studies, Social values, Social impact.
Identifiers: *Public participation, Bargaining arena.

The water resource planning process has become a cause rather than a cure of recent controversies. These controversies have been agitated by changes in population, technology, distribution of societal influence, and societal values. The need is demonstrated to integrate technical planning activities with societal process. A nonoperational analog to implement the integration is suggested. The technical planning process has often been modelled. Modelling of the societal process is more difficult, but recent developments in public participation programs provide a number of examples. Under the analog, the technical and participation models are assumed to follow parallel paths, exchanging information periodically through a bargaining arena. The arena performs a number of key tasks, including identification of participation groups, preferences, problem areas, and levels of acceptance of alternative plans. The model performs iteratively, with the plan modified until all participants are satisfied, or until the level of arena satisfaction is acceptable to the agency. Through the arena, policy can be specified at the local level and alternative social decision rules can be incorporated. A regional water quality management problem is used to illustrate the application of the model. (Schroeder-Wisconsin)
W74-03951

PYRAMID LAKE RECREATION DEVELOPMENT PLAN. INITIAL FACILITIES,
California State Dept. of Water Resources, Sacramento.
A. G. Thrapp.
Bulletin No. 117-13, May 1972. 12 p, 2 fig, 1 tab.

Descriptors: *Recreation facilities, *Planning, *California, *Reservoirs, Fishing, Recreation demand, Wildlife, Benefits, Costs, Cost-benefit ratio, Capital costs, Boat launching ramps, Landscaping, Potable water, Beaches, Swimming, Estimated costs, Environmental sanitation.
Identifiers: Pyramid Lake(Calif.).

Pyramid Lake will be located in the Los Padres and Angeles National Forests in northwestern Los Angeles County. The lake is one of the major reservoirs of the State Water Project to be constructed in Southern California and will provide for power generation, storage, and regulation of water and a potential for fishery enhancement. In addition recreation opportunities will be provided by planned development which will include high-speed boating, water skiing, sailboating, fishing, picnicking, and swimming. Proposed facilities consist of a boat launching ramp, picnic units, landscaping, water and sanitary facilities, a swimming beach, and boat-in areas. Unit recreation benefits were established at $1.45; the unit benefit value of trout fishing was established at $2.50/angler-day. Capital cost of the initial onshore facilities is estimated at $1,095,800 based on 1972 prices. Implementation of the fishery enhancement program will include an initial investment for a warmwater fishery of $2,500 and an annual expenditure of $40,000 for trout replenishment. A value of $.30/recreation day per year was assigned to compute annual operations and maintenance costs. Based on a 50-year period of analysis at 5% interest, the total present worth benefit is estimated to be $5,476,000 and the present worth cost about $3,015,000. (Slattery-Wisconsin)
W74-03955

LOS BANOS RESERVOIR RECREATION DEVELOPMENT PLAN,
California State Dept. of Water Resources, Sacramento.
F. S. Nevins.
Available from: State of California Documents Section, P.O. Box 20191, Sacramento, California 95820, Price $1.00. Bulletin No. 117-11, April 1971. 15 p, 2 fig, 8 tab.

Descriptors: *Recreation facilities, *Planning, *Reservoirs, Water utilization, Capital costs, Wildlife, Sport fishing, Estimated cost, Cost-benefit ratio, Benefits, Fishing, Costs, Boating, *California, Camping, Swimming, Water sports.
Identifiers: *Recreation development, Los Banos Reservoir(Calif.), Picnicking.

Los Banos Detention Dam was constructed in the Los Banos Creek channel upstream from the California Aqueduct to protect the aqueduct and downshore areas from the higher flows of the creek and to provide fishing and recreational opportunities. When developed, the reservoir and surrounding land will accommodate boating, fishing, camping, picnicking, swimming, riding, and hiking. Initial recreation facilities would be constructed during the 1970-1980 period and would cost approximately $463,000. The cost of developing both initial and future facilities is estimated to be $3,080,000. These facilities would accommodate 425,000 recreation days of use annually by the year 2020. The fishery development and management costs include initial development at $7,000 and annual management costs of $13,000. The unit benefit value for recreation was established as $1.59 for the period prior to 1980 and $1.83 for 1980 and the years following. All recreation and fish and wildlife enhancement benefits and costs have been converted to 1970 worth value, based on a 50-year period of analysis at 5% interest. The total present worth benefit is estimated at $4,300,000 and the present worth cost is estimated at $3,300,000. The benefit-cost ratio for the plan is 1.3:1. (Slattery-Wisconsin)
W74-03956

EXTERNALITIES, SHADOW PRICES, AND BENEFIT-COST CALCULATIONS,
Illinois Univ., Urbana. Dept. of Economics.
F. R. Shupp.
Quarterly Review of Economics and Business, Vol 12, No 4, p 91-94, 1972.

Descriptors: *Indirect benefits, *Tangible benefits, *Optimization, *Project benefits, *Cost-benefit ratio, Dam construction, Irrigation, Marginal benefits, Direct benefits.
Identifiers: Pecuniary externality, Technological externality.

Recent dialogues in benefit-cost literature have argued that such calculations should include technological externalities and exclude pecuniary externalities. A formal mathematical proof is presented to illustrate these facts. A dam used only for irrigation is first considered. A LaGrangean function is formed with a budget constraint on construction funds. The LaGrangean multiplier, the shadow price of the last dollar invested is computed from first order conditions shown to be the marginal benefit-cost ratio. Next, a technological externality is introduced in the form of a second dam which permits the construction of a smaller downstream dam with the same irrigation potential. The multiplier is shown to have increased, illustrating that the technological externality has some effect on the comparison of the resulting multiplier shows that the externality has no effect and can be ignored. The results are extended to include imperfect markets and distributional considerations. (Schroeder-Wisconsin)
W74-03960

INTEGRATING NATURAL RESOURCES INTO AREAWIDE AND LOCAL PLANNING: THE SOUTHEASTERN WISCONSIN EXPERIENCE,
Southeastern Wisconsin Regional Planning Commission, Waukesha.
H. E. Clinkenbeard.

Descriptors: *Comprehensive planning, *Regional development, *Wisconsin, *Land use, *Planning, Regional analysis, Resource allocation, Soil surveys, Transportation, *Natural resources, Urbanization.
Identifiers: Planning commissions.

From the beginning, the seven county Southeastern Wisconsin Regional Planning Commission has recognized that identification of its natural resources is a vital element in sound planning. In 1962 the Commission undertook a comprehensive transportation study for the region. The Commission itself was expanded to 96 members to encourage interdisciplinary discussion. The initial step was to define the type and depth of data to be collected and to rank it according to its importance. Data were coded according to the U.S. Public Land Survey, with a quarter section representing a unit for which all applicable data could be delineated, coded, measured and mapped. The Commission's early activities were limited to the development of a regional soil survey. This inventory was considered particularly important because of the varying capacities of soils to handle waste material. From the survey a major report, 'Soils of Southeastern Wisconsin,' was published. The soils data have been a major element in the determination of land suitable for urban purposes, shaping land use plans and identifying prime agricultural land which should be protected from urban encroachment. Subsequent studies by the Commission have examined wildlife habitats, stream quality and recreational sites. Continuation of this program is considered essential to future urban development planning activities of the Commission. (Schroeder-Wisconsin)
W74-03965

LEVELS OF ASSESSMENT,
Upper Mississippi River Basin Commission, Twin Cities, Minn.
G. Griebenow.
Water Spectrum, Vol 5, No 2, p 24-29, 1973. 6 photo.

Descriptors: *Water resource planning, *Water resource development, *Waste treatment, *Water utilization, *Mississippi River Basin, Water conservation, Irrigation, Navigation, Wildlife conservation, Flood control, Regions, Recreation, Watersheds, Pollution control, Pollution abatement, Cities, Assessment.

The Upper Mississippi River Basin Commission was established to study and plan for the problems and designated priorities of water resources within the basin. The studies are broken down to levels. Level A is a comprehensive regional or framework type. Level B studies involve general metropolitan areas, including their immediate river basin proximities. Level C studies will look at more detailed problems within the areas geographically designated in Level B. They will determine what specific action will be undertaken by the end of the decade. The studies may include tributary basins, sub-basins, multi-state political borders, economic regions or areas the Commission deems pertinent. The basin covers a watershed of 189,000 square miles, or 121 million acres. Concurrence of the governor of each state is needed prior to a study being done within that state. Advanced wastewater treatment facilities rank high among the basin's overall priorities, as does flood control through non-structural measures such as flood plain zoning. Recreational development, conservation of wildlife resources and water supply are also among the main concerns. Also considered as essential goals are continuing use of water for irrigation, year round navigation and development of commercial fishing industries. (Silber-Florida)
W74-04035

A GENERAL PROCEDURE FOR CONSUMPTION-DENSITY STUDIES,
California Univ., Santa Barbara. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W74-04040

THE IMPACT OF COSTS ASSOCIATED WITH NEW ENVIRONMENTAL STANDARDS UPON THE PETROLEUM REFINING INDUSTRY. PART II. STRUCTURE OF THE INDUSTRY.
Sobtoka (Stephen) and Co., New York.
For primary bibliographic entry see Field 3E.
W74-04076

THE ECONOMIC IMPACT OF POLLUTION CONTROL. AN OVERVIEW, A SUMMARY OF RESEARCH STUDIES.
Chase Econometric Associates, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 5G.
W74-04077

ECONOMIC IMPACT OF ANTICIPATED PAPER INDUSTRY POLLUTION-ABATEMENT COSTS. PART III. ECONOMIC ANALYSIS.
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W74-04078

AN INVESTMENT DECISION MODEL FOR CONTROL TECHNOLOGY,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5G.
W74-04079

THE EFFECTS OF POLLUTION CONTROL ON THE NONFERROUS METALS INDUSTRIES. COPPER. PART I. INTRODUCTION AND EXECUTIVE SUMMARY.
Charles River Associates, Inc., Cambridge, Mass.

For primary bibliographic entry see Field 5G.
W74-04081

THE EFFECTS OF POLLUTION CONTROL ON THE NONFERROUS METALS INDUSTRIES. COPPER. PART II. STRUCTURE OF THE INDUSTRY.
Charles River Associates, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W74-04082

SOME MODELS FOR THE ECONOMIC EVALUATION OF THE ENVIRONMENT,
Netherlands School of Economics, Rotterdam.
For primary bibliographic entry see Field 5G.
W74-04083

EXTERNALITIES, ENVIRONMENTAL POLLUTION AND ALLOCATION IN SPACE: A GENERAL EQUILIBRIUM APPROACH,
Oslo Univ. (Norway). Inst. of Economics.
For primary bibliographic entry see Field 5G.
W74-04084

ECONOMIC AND SOCIAL PROJECTS WITH ENVIRONMENTAL REPERCUSSIONS: A SHADOW PROJECT APPROACH,
Netherlands School of Economics, Rotterdam.
L. H. Klaassen.
Regional and Urban Economics, Vol 3, No 1, p 83-102, 1973. 1 ref.

Descriptors: *Cost-benefit analysis, *Cost-benefit theory, *Environment, *Welfare(Economics), Decision making, Mathematical studies, Estimated benefits, Monetary benefits, Case study.
Identifiers: Specific project effects.

The traditional cost-benefit analysis depends upon consideration of both direct and future induced or autonomous changes in the target variable. However, such consideration has been limited by the inability to translate such effects into common monetary value or shadow price with the consequence that subjectively determined weights must be used. Consideration of this problem within a mathematical framework leads to the suggestion of different use of cost-benefit analysis, which allows ignoring evaluation of social and environmental factors by explicit and separate consideration of specific project effects on economic-technical, social and natural capital. A simplified example provides illustration of the technique in evaluating the construction of a dam with a highway. (Weaver-Wisconsin)
W74-04085

THE ENVIRONMENTAL COST OF ECONOMIC GROWTH,
Washington Univ., St. Louis, Mo. Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 5G.
W74-04088

A SOCIAL REPORT - MAN AND WATER, THE RELATIONSHIP BETWEEN SOCIAL PSYCHOLOGICAL SYSTEMS AND WATER RESOURCES DEVELOPMENT,
Abt Associates, Inc., Cambridge, Mass.
S. J. Fitzsimmons, and O. A. Salama.
Prepared for Bureau of Reclamation, Engineering and Research Center, Denver Federal Center, Denver, Colorado, November 1973. 428 p, 30 fig, 174 ref. Bur Rec Contract 14-06-D-7342.

Descriptors: Social project benefits, Social projections, *Social data, Data aggregation, Data synthesis, Public benefits, *Social psychology.
Identifiers: *Behavior, Demography, Human population, Indirect benefits, Long term planning, Optimum development plans, Planning, Political aspects, Benefits, Reliability, Social aspects, Social change, *Social impact, Social mobility, *Social needs, Social participation, *Social values, Water policy, Water resources development, *Cost-benefit analysis.

This study examined the social-psychological relationship of man to water resources development and then constructed preliminary measures to assess the social benefits and costs to man of water development. The measures were designed to be capable of (1) integration with other measures (economic, environmental, and technical) and (2) aggregation (e.g., to regional and national levels). The fields of Sociology and Social Psychology were reviewed, and seven conceptual areas were identified: Individual; Group; Organization; Social Process; Social Maintenance and Change; Society; and Population. A similar review of Water Development literature identified 14 water functions, such as Ecology, Supply and Energy Recovery. These two groups of variables were arrayed upon one another. Three types of interactions were considered: social needs for water; water functions with positive social impacts; and water functions with negative social impacts. Based upon review of the research and theory of the fields, a large number of parameters of interactions were identified. These were reviewed in light of water program and policy considerations and more than 250 preliminary social measures were proposed. The issues of data collection and analysis; synthesis of social data with economic, environmental and technical data; and data aggregation were addressed. Recommendations were made regarding pilot testing of social measures, synthesis and aggregation of data, and future national water assessment activities.
W74-04170

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE IMPACT OF WATER POLLUTION ABATEMENT ON COMPETITION AND PRICING IN THE ALABAMA PAPER INDUSTRY,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 5D.
W74-03752

THE ECONOMIC BENEFITS OF ABATING WATER POLLUTION IN THE STEEL, TEXTILE, AND PAPER INDUSTRIES IN ALABAMA,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 5D.
W74-03753

AN APPLICATION STUDY IN WATER DISTRIBUTION CONTROL,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 8C.
W74-03755

COST ANALYSIS OF GROUNDWATER SUPPLIES IN THE NORTH ATLANTIC REGION, 1970,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 4B.
W74-03815

GROUNDWATER RECHARGE FOR WASTE WATER RECLAMATION AND/OR STORAGE OF SUPPLIES: A COST COMPARISON WITH CONVENTIONAL METHODS,
Asian Inst. of Tech., Bangkok (Thailand).
For primary bibliographic entry see Field 5D.
W74-03825

LOWER COST WATER HARVESTING METHODS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 3B.
W74-03952

PHYSICAL-CHEMICAL WASTEWATER TREATMENT PLANT DESIGN,
CH2M/Hill, Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W74-03957

ACCOUNTING FOR POLLUTION: POLLUTION ABATEMENT AND THE NATIONAL PRODUCT,
Michigan State Univ., East Lansing. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-03959

A NEW APPROACH TO DOMESTIC WATER RATING,
I. D. Curruthers.
Eastern Africa Economic Review, Vol 4, No 2, p 73-96, 1972. 5 ref.

Descriptors: *Water rates, *Costs, *Africa, Water demand, Water supply, Prices, Economic efficiency, Welfare(Economics), Discriminatory pricing, *Domestic water.
Identifiers: *Kanya, Marginal cost pricing.

While water rates in Kanya primarily reflect financial objectives, economic and social objectives also are considered. These objectives can be satisfied, respectively, by rates equal to average cost, marginal cost, or promoting redistribution, stability, or development. A majority of existing schemes in Kenya do not cover all costs, a result both of social considerations and inadequate collection methods. An examination of the economics of water systems reveals increasing returns to scale and decreasing average cost. Under these conditions marginal cost pricing can accomplish both social and economic objectives. Modifications of marginal cost pricing, including price discrimination, may also satisfy a financial objective that the system cover all costs. Policies should be enacted to encourage individual water connections, free communal facilities, long-run marginal cost pricing for industrial users, two-part tariffs on metered urban use, and rates reflecting zonal ability to pay for rural consumers. Under these conditions, it is predicted that individual connections would be subsidized initially with costs being fully met by 1989. If communal water is provided freely, a larger treasury subsidy would be required than at present. (Schroeder-Wisconsin)
W74-03963

AN INVESTMENT DECISION MODEL FOR CONTROL TECHNOLOGY,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5G.
W74-04079

OPTIMUM FORAGE PRODUCTION AND THE ECONOMIC ALTERNATIVES ASSOCIATED WITH GRAZING IRRIGATED WHEAT, TEXAS HIGH PLAINS,
Texas Agricultural Experiment Station, Bushland.
For primary bibliographic entry see Field 3F.
W74-04086

DIGITAL COMPUTER PROGRAMS FOR THE COST ENGINEER.
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W74-04087

6D. Water Demand

ALTERNATIVE FUTURES USING THE WOLLMAN-BONEM MODELS,
University of Southwestern Louisiana, Lafayette. Dept. of Statistics.
For primary bibliographic entry see Field 6A.
W74-03888

SOME DATA ON THE WATER ECONOMY AND THE UTILIZATION OF WATER RESOURCES IN BULGARIA, INCLUDING IRRIGATION,
Bulgarian National Committee on Irrigation and Drainage, Sofia. Water Development Design Inst.
For primary bibliographic entry see Field 3F.
W74-03954

A GENERAL PROCEDURE FOR CONSUMPTION-DENSITY STUDIES,
California Univ., Santa Barbara. Dept. of Economics.
W. D. Morgan.
Journal American Water Works Association, Vol 65, No 11, p 707-709, November 1973. 1 photo, 1 tab.

Descriptors: *Forecasting, *Project planning, *Hydrologic data, *Adoption of practices, *Cost allocation, Administration, Waters demands projections, Potential water supply, Domestic water, Consumptive use, Economics, Supply, Economic prediction, Future planning, Costs, Demand.
Identifiers: Density studies, Binary variables.

The problem of long and short term forecasting of water needs faces local water agencies. Described are the procedure used in the typical density study and how such a study is useful to the local agency in determining the average expected consumption per unit of time of any proposed residential development. These studies have various drawbacks. An alternative method of forecasting involves the use of multivariate regression analysis using binary variables. The use of a binary system would be easier and cheaper, and unlike the density method additional factors influencing water use could be utilized. An example is set forth and it is also shown how such a method can be used in conjunction with the established density studies. Binary variables which measure either the presence or the absence of particular characteristics avoid the high cost of data-gathering. (Sutton-Florida)
W74-04040

6E. Water Law and Institutions

WATER RESOURCES NEWSLETTER, JUNE 1973.
Australian Water Resources Council, Canberra.
For primary bibliographic entry see Field 4A.
W74-03774

NATIONAL WATER COMMISSION REPORTS.
For primary bibliographic entry see Field 6B.
W74-03890

LET'S ENFORCE THE RULES,
W. H. Grafftey.
Canadian Business, p 58-59 and 64, May 1973.

Descriptors: Decision making, Regulation, Penalties(Legal), *Social values, Pollution abatement, *Political constraints, Water quality standards.
Identifiers: *Environmental standards, Enforcement.

In recent years, environmental improvement has emerged as a goal of industrial societies and indicates a change in societal values. Governments have responded by implementing environmental standards and creating new regulatory agencies. Conflicts have arisen, however, in the implementation of these standards. First, enforcement has been hindered by the political implications of plant closings. Effective lobbying has led to delays in implementing standards. Additionally, criticism has been leveled at the existence of unequal enforcement between jurisdictions, which discourages the enforcement of standards. Each of these problems must be examined in order to encourage enforcement of the emerging value of environmental improvement. (Schroeder-Wisconsin)
W74-03891

DISTRIBUTIONAL IMPACTS OF ENVIRONMENTAL QUALITY MANAGEMENT: THE CASE OF FEDERAL GRANTS FOR WATER POLLUTION CONTROL,
New York State Coll. of Agricultural and Life Sciences, Ithaca.
For primary bibliographic entry see Field 5D.
W74-03894

THE GROUND-WATER DEPLETION ALLOWANCE UNDER THE FEDERAL INCOME TAX,
Kansas State Univ., Manhattan. Dept. of Economics.
E. W. Bagley.
Natural Resources Journal, Vol 12, No 3, p 445-466, 1972. 2 tab.

Descriptors: *Water law, *Adjudication procedure, *Groundwater, *Taxes, *Water rights, Irrigation water, Water utilization, Water table, Water yield, California, Texas, Arizona, Kansas.
Identifiers: *Depletion allowance.

In 1961, a Federal court upheld a Texas ruling granting a cost depletion allowance deduction for groundwater pumping (Shubert) in the Ogallala formation in the Southern Plains of Texas and New Mexico. The court emphasized that groundwater depletion was allowed in Texas and suggested that the decline in saturation thickness, a method presently used for gas, provided an adequate measure. Neither the Internal Revenue Service nor subsequent litigation has extended the ruling to other areas. Its future extension depends particularly on state water laws and local groundwater conditions. The allowance requires that such depletions are permissible and that the right is itself marketable. Some states have limited withdrawal to perennial yield, thereby foreclosing depletion. Other traditional water-rights laws determine what rights the user has to the resource in order to claim a deduction. Determination of the actual deduction centers on its correlation with either the withdrawal by the user or the decline in the water supply, the latter used by Shurbet. This problem arises because water can be pumped by adjacent land owners as well. It is important to recognize that there exists a difference between the economic and physical supply. Pumping costs may exclude exploitation of the entire physical supply. The present lack of litigation may represent both the state's limitation and the irrigator's desire to maintain a low visibility when withdrawals exceed recharging. (Schroeder-Wisconsin)
W74-03962

PEOPLE V. MACK: A SPORTSMAN'S DEFINITION OF NAVIGABILITY,
W. K. Shipley.
Environmental Law, p 68-73, Spring 1973. 15 ref.

Descriptors: *California, *Navigable waters, *Streams, *Riparian land, *Riparian rights, Sport fish, Recreation, Obstruction to flow, Injunction, Water law, Legal aspects, Competing uses, Fishing, Navigable rivers.

This case involves the navigability of a river. The river is twenty miles long and varies in depth and width and has not been used to carry any sort of commerce. Riparian land owners placed wires and cables across the river thus disrupting fishing by sportsmen who were not able to use their small boats along the river. These obstructions led to a suit. The state of California declared these cables to be obstructions of a navigable stream as a public nuisance and sought an injunction for their removal. Defendant land owners contend that the river was not a navigable stream and thus the state lacked the power to enjoin their actions. The court rejected the traditional commercial use definition of navigability as a sole test and upheld the injunctions. The court held that even though a stream is not or cannot be used as a highway for commerce, it is navigable if it is capable of being used by small pleasure boats for purely recreational purposes. (Daniels-Florida)
W74-03967

WATER RESOURCE COMMISSION.
Conn. Gen. Stat. Ann., sec. 25-4a, 25-5b, 25-5c (Supp. 1972), as ammended, act 73-590, sec. 2, act 73-555, sec. 1, act 73-679, sec. 39, 40, 41 (1973), Pub. Acts of Conn.

Descriptors: *Connecticut, *Water resources, *Water resources development, *Flood plain zoning, *Water management(Applied), Legislation, Water, Non-structural alternatives, Water demand, Water utilization, Land use, Sewage, Sewage disposal, Natural resources, Environment, Environmental control.

Protection and preservation of natural resources and ecosystems are now required to be considered in granting or denying applications for permits to encroach on the flood plain areas established by the Connecticut commissioner of environmental protection. The Connecticut departments of environmental protection, health and the office of state planning are required to prepare and periodically update a statewide long range plan for the management of the state's water resources. These agencies shall identify quality and quantity of water available, project water demands, and make recommendations for water utilization, land use and engineering works, and also take into account recreational, agricultural, industrial and commercial water needs. The commissioner of environmental protection must regulate and compel sewage discharge systems to operate in such a manner as will conserve and protect the natural resources and environment of Connecticut. Financing the technical assistance necessary to implement the requirements of the act, and grants issued pursuant to it, are under the control of the managing director of the planning and budgeting division in the Connecticut department of finance and control. (Ritchie-Florida)
W74-03969

STUDY OF WATER RESOURCES AND MANAGEMENT.
Ind. Ann. Stat. secs. 27-1701 thru 27-1709 (1970).

Descriptors: *Legislation, *Water Resources Research Act, *Indiana, *Water resource development, *Planning, *Census, Water rights, Water management, Water resources, Water law, Comprehensive planning, Investigations.

A study committee is created made up of members from several Indiana state agencies, the state legislature and University officials. The committee is directed to make a comprehensive study and survey of water rights and water management including surface and ground waters. The study committee is directed to submit a written report of its findings and recommended legislation. The purpose of this water resources research act is to provide proper development, use and management of the state's resources based on sound and thorough

knowledge and understanding of the location, extent, capabilities, limitations and characteristics of the basic water resources of the state. (Daniels-Florida)
W74-03970

GENERAL POWERS OF CITIES AND TOWNS--STREETS, ALLEYS, WATER-COURSES, SEWERS--CONTROL.
Ind. Ann. Stat. secs. 48-500 thru 48-503 (Supp. 1972).

Descriptors: *Control, *Legislation, *Indiana, *Cities, Regulation, Management, Water rights, Watercourse, Sewers, Drains, Lakes, Banks, City planning, Legal aspects, Jurisdiction, Water law, Governments, Water resources, Local governments.

A legislative grant of power is made to Indiana municipal governments. Except when otherwise provided by law, such municipalities shall have exclusive power over the streets, alleys, watercourses, sewers, drains, bridges and public grounds within its jurisdiction. (Daniels-Florida)
W74-03971

WATER POLLUTION.
Ill. Ann. Stat., ch. 111 1/2, sec. 1011, 1012, 1013 (Smith-Hurd Supp. 1973), as amended, act 78-862, sec. 11, 12, 13 (1973), Ill. Pub. Acts.

Descriptors: *Illinois, *Legislation, *Water pollution, *Water pollution sources, *Law enforcement, Environment control, Environmental effects, Administration, Pollution abatement, Water quality control, Federal Water Pollution Control Act, Governments, Permits, Water quality standards, Water quality act.

The title's urpose is to restore, maintain, and enhance the purity of the waters in order to protect health, property and the quality of life in the state of Illinois. This is to be done by assuring that no discharge is released into waters of the state without being given the degree of treatment or control necessary to prevent pollution. Any pollution is subject to such conditions as are required by state or federal law. The title authorizes the Pollution Control Board and Agency to adopt such regulations and procedures which will enable the state to secure federal approval to issue National Pollution Discharge Elimination System (NPDES) permits pursuant to the provisions of the Federal Water Pollution Control Act Amendments of 1972. Section 12 sets forth exactly what manners of polluting will be deemed unlawful and explains the permit system to be utilized. Section 13 outlines the regulations the Board will have power to prescribe and enforce. These include water quality standards, effluent standards, construction permits and certification of technical competency of operation personnel for sewage works. (Sutton-Florida)
W74-03972

PRIVATE RIGHTS IN WATERS.
N.Y. Sess. Laws, Ch. 664, sec 15-0701, (McKinney 1972).

Descriptors: *Water rights, *Riparian rights, *Reasonable use, *Alteration of Flow, Prescriptive rights, Legislation, Banks, Ownership of beds, Relative rights, Damages, Impoundments, Lakes, Watercourses, Natural flow, Water law, Legal aspects, Diversion, Flow, Relative rights.

A declaration is presented of private water rights. Reasonable use by way of impoundment, withdrawal or obstruction of water is provided. However such activities are made unlawful and a cause of action for damages or injunctive relief is provided where the use is not reasonable. Thus the statute provides for a judicial determination of reasonableness. (Daniels-Florida)
W74-03973

SHORE EROSION CONTROL.
Md. Code Ann., art. 66C, sec. 756-758 (Supp. 1973).

Descriptors: *Legislation, *Erosion control, *Financing, *Planning, *Maryland, State governments, Future planning, Administration, Bank protection, Bank stability, Water control, Structural designing, Shores, Structures, Beach erosion, Shore protection.

The Maryland Department of Natural Resources shall develop and implement a public education program on all phases os shore and bank erosion. It shall review petitions for formation of shore erosion control districts and provide technical assistance to property owners, municipalities and counties with specific shore and bank erosion problems. The Department shall also design shore erosion control structures, provide for their construction, administer loans in support of this construction, supervise design and erection of the structures and prepare requests for fund appropriations. The Department shall cooperate with other necessary agencies in facilitating its functions and promulgate regulations to administrate and regulate its mandate. The Shore Erosion Control Construction Loan Fund to be administered by the Department shall provide interest-free loans for the construction of shore erosion structures. (Silber-Florida)
W74-03974

ASSAULT ON A LAKE,
For primary bibliographic entry see Field 5G.
W74-03975

THE POTOMAC, WATER QUALITY PLANNING.
Interstate Commission on the Potomac River Basin, Bethesda, Md.
For primary bibliographic entry see Field 5G.
W74-03977

WATER RESOURCES.
N.Y. Sess. Laws, ch. 664, sec. 15-0101 through 15-0317 (McKinney 1972).

Descriptors: *New York, *Water law, *Water resources, *Water pollution control, *Water quality, Water, Legislation, Permits, Water management, Water pollution, Public health, Legal aspects, Water supply, Water utilization, Water resources development, Water supply development.

The Water Resources Law, article 15 of the New York Environmental Conservation Law, was enacted to provide an adequate and suitable water supply, essential to public health. The policy requires that the waters be conserved and developed for all public beneficial uses through comprehensive planning, wise use, and development of water resources in order to meet present and future needs. The department of environmental conservation may make any investigations necessary for the discharge of its duties, and examine the books of any licensee or holder of a permit under this article. The department is empowered to bring actions, suits or proceedings necessary to enforce the provisions of the Water Resources Law, and also, with certain restrictions and limitations, exercise the power of eminent domain. The department shall establish or amend classifications of waters and adopt standards of purity and quality, and adopt and enforce regulations on the use of chemicals to maintain those standards. In addition, the department is authorized to exercise all the functions, powers and duties of the former Water Resources Commission and the former Water power and Control Commission. (Ritchie-Florida)
W74-03980

A BILL AUTHORIZING THE SECRETARY OF THE ARMY TO CONSTRUCT FLOODWATER CHANNELS.
Senate Bill 725, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *Flood control, *Flood protection, *Construction, *Legislation, Structures, Watersheds management, Erosion control, Land management, Channel, Channel improvement, Water control, Flood routing, Floodways.

Senate Bill S.725 was referred to the Committee on Public Works. The bill authorizes the Secretary of the Army to construct three flood-water channels for flood prevention and other purposes in the Lower Rio Grande Basin and nearby counties in Texas at an estimated cost of twenty-one million dollars. The Secretary of the Army is to seek reasonable assurances that an adequate land treatment program satisfactory to the Secretary of Agriculture will be installed to provide necessary protection to the watershed lands and planned structural measures. (Daniels-Florida)
W74-03981

PORT, HARBOR AND TERMINAL DISTRICTS; POWERS AND DUTIES; BONDS.
La. Const. art 14 sec 31 (Supp. 1973). 4 p.

Descriptors: *Louisiana, *Port authorities, *Harbors, *Governmental interrelations, Government finance, Dredging, Channels, Ships, Basins, Navigable waters, Eminent domain, Leases, Industrial production, Tax rates, Bond issues, Grants.

The Louisiana Constitution authorizes the state legislature to create port, harbor and terminal districts as political subdivisions of the state. These districts possess full corporate powers. They may fix their territorial limits and provide for their organization and government. Moreover, they may define their duties, powers and jurisdictions and delegate to themselves the authority to own, construct, operate and maintain docks, wharves, sheds, elevators, locks, steps, laterals, basins, warehouses and all other property and structures necessary for useful port, harbor, and terminal purposes. The districts may dredge and maintain shipways, channels, slips, basins and turning basins; cooperate with other governmental agencies in establishing, maintaining and operating navigable waterway systems; and acquire by eminent domain, purchase, lease or otherwise, the land necessary for such districts. The district may acquire industrial plant sites and acquire or construct industrial plant buildings. They may lease or sublease for processing, manufacturing, commercial and business purposes, lands or buildings. Finally, the districts can borrow funds, mortgage properties, and incur debts and issue bonds. (Napolitano-Florida)
W74-03982

PETTERSON V. FROEHLKE (CHALLENGE TO DREDGING PERMIT ISSUED BY CORPS OF ENGINEERS).
354 F. Supp. 45-50 (D. Oregon 1972).

Descriptors: *Legislation, *Conservation, *Structures, *Legal aspects, *Public lands, *Public rights, Environment, Streamflow, Dredging, Environmental effects, Federal project policy, Federal government, Concrete construction, Conservation, Constraints, Columbia River.
Identifiers: National Environmental Policy Act.

Plaintiffs sought a declaratory judgment against the proposed expansion of the Portland International Airport, and the construction of the I-205 bridge across the Columbia River. The best method available involved filling in part of the river. The Federal Aviation Agency found the plans to be safe and efficient, and the Corps of Engineers issued a dredge and fill permit. Several federal environmental laws were enacted since the

projects were begun. The National Environmental Policy Act (NEPA) requires federal agencies to make environmental impact studies before taking major action. Section 16 of the Airport and Airway Development Act requires the Secretary to insure that environmental effects are minimized in airport construction projects before granting federal assistance. Plaintiffs fear that dredging will impair the recreational and wildlife value of the area and lead to erosion of the riverbank. The United States District Court held that NEPA applies retroactively to a continuing project only if major action need be taken by a federal agency after its date of effect. The court ruled that since the Corps had to perform no such actions after issuing the permit, NEPA does not affect the permit. (Silber-Florida)
W74-03983

COMMONWEALTH V. HARMAR COAL CO. (DENIAL OF MINE DRAINAGE PERMITS).
306 A.2d 308-321 (Pa. 1973). 14 p.

Descriptors: *Pennsylvania, *Coal mine wastes, *Permits, *Judicial decisions, *Mine drainage, Drainage practices, Mine acids, Industrial wastes, Coal mines, Wastes, Water pollution sources, Legal aspects, Water pollution, Drainage effects, Mine wastes.

The case involved mine drainage permits by two coal companies. The permits were denied by the Sanitary Water Board. The denial was affirmed by the Pennsylvania Supreme Court. The Court ruled that under the Clean Streams Law the Board could require coal companies to treat all drainage from its mining operation despite the fact that much of the drainage originated in adjacent inacitve mines owned by other companies. The court also ruled that a total treatment requirement was not unduly oppressive in that it was not a prohibition but only resulted in an increase in the cost of operation. The court further stated that an aquatic study was not a prerequisite to the denial of a mine drainage permit. (Sears-Florida)
W74-03984

IOWA WATER POLLUTION CONTROL COMMISSION V. TOWN OF PATON (AUTHORITY TO COMPEL TOWN TO CHANGE ITS SEWAGE SYSTEM).
207 N.W.2d 755-765 (Iowa 1973). 11 p.

Descriptors: *Iowa, *Abatement, *Municipal wastes, *Water pollution control, *Judicial decisions, Commissions, Solids, Sludge, Sewage, Sludge deposits, Surface water, Water pollution, Water pollution sources, Water law, Legal aspects, Cities, Disposal.

Plaintiff, Iowa Water Pollution Control Commission, discovered that defendant town was in violation of two standards prohibiting the discharge of sewage without removal of floatable and settleable solids and prohibiting municipal discharges into surface waters that would form sludge deposits. Negotiations culminated in a consent order. The Commission commenced contempt proceedings for the town's alleged disobedience of the consent order. The Supreme Court of Iowa held the Commission had authority to enter into a consent order with the town requiring the town to cease polluting, even though no hearing was held, and that the town had statutory authority to agree to the consent order. The court stated all polluters are to be treated equally and municipalities are not favored. (Sears-Florida)
W74-03985

A BILL TO AUTHORIZE EXTENSIONS OF THE AMERICAN CANAL AT EL PASO, TEXAS.
House Bill 2924, 93d Cong, 1st Sess (1973). 3 p.

Descriptors: *Water loss, *Rio Grande River, *Mexico, *Legislation, *Canal construction, Canals, Construction, Water supply, Rationing(Water), Water allocation(Policy), Operation and maintenance.

The House of Representatives Bill No. 2924 was referred to the Committee on Interior and Insular Affairs. The bill authorizes the construction of extensions of the American Canal at El Paso, Texas, and provides for its operation and maintenance. The bill's purpose is to attempt to salvage water losses and to facilitate cooperation between the United States and Mexico by providing for the equitable division of the waters of the Rio Grande. This bill authorizes money for the construction of the thirteen miles of canal extensions and all other powers needed by the Secretary of the Interior to appropriately carry out the purposes of this act. (Daniels-Florida)
W74-03986

PORT OF PORTLAND V. AN ISLAND IN COLUMBIA RIVER (ACTION TO QUIET TITLE TO ALLUVIAL ISLAND IN COLUMBIA RIVER).
479 F.2d 549-552 (9th Cir. 1973). 4 p.

Descriptors: *Boundary dispute, *Judicial decisions, *Islands, *Columbia River, *Alluvial channels, Boundaries, Washington, Oregon, Accretion, Sediments, Alluvial fans, Fluvial sediments, Rivers.
Identifiers: Main channel, Widest channel, Interstate compact.

The issue involved in this case was the ownership of an island in the Columbia River which emerged as the result of alluvial deposits after both Oregon and Washington had been admitted as states. The River constituted the boundary between Oregon and Washington. An Interstate Compact in 1958 between Washington and Oregon placed the island within the latter state. The dispute arose from a 1929 conveyance by the State of Washington; it was thus necessary to determine the pre-1958 ownership of the island as the 1958 Compact would not invalidate such conveyance if Washington owned the island at the time. The determination revolves around the boundary of the State of Oregon which is the middle channel of the Columbia River. The United States Court of Appeals reversed the lower court's determination that the island belonged to Oregon because the river was divided by an island and the widest channel was to the north and the middle of the widest channel was the boundary. In remanding the court said that islands formed subsequently to 1859 are not to be considered in determining the boundary, that the boundary remains what it was in 1859, the varying center of the main channel. (Gragg-Florida)
W74-03987

PORTLAND PIPE LINE CORPORATION V. ENVIRONMENTAL IMPROVEMENT COMMISSION (CONSTITUTIONALITY OF A STATE STATUTE).
307 A.2d 1-48 (Me. 1973). 48 p.

Descriptors: Oil, *Water pollution sources, *Maine, *Oil spills, Navigable waters, Environmental effects, Estuaries, Tidal effects, Legislation, Aquiculture, Coasts, *Oil pollution, Beaches, Public lands.
Identifiers: Coastal Conveyance Act, *Coastal waters.

Actions were brought by plaintiff petroleum corporations for judgments declaring that the Coastal Conveyance Act, and act relating to overwater transfers of petroleum, violates various provisions of the United States and Maine constitutions. The legislature of Maine passed legislation designed to diminish pollution of the environment. The purpose of the Coastal Conveyance Act is to maintain the seacoast for public and private recreation and for commercial use for food production, and to preserve these areas it must use effective methods to maintain coastal waters, estuaries, tidal flats, beaches and public lands adjoining the seacoast. The court found that the Maine legislature by passing the act had a legitimate object to effectuate and that it molded and modeled the exercise of its powers as its wisdom and the public interest required and that such act was not unconstitutional. (Daniels-Florida)
W74-03988

DISCLOSURE OF UNLAWFUL OIL DISCHARGE PROVIDES IMMUNITY FROM PROSECUTION,
For primary bibliographic entry see Field 5G.
W74-03989

CANALS AND WATERWAYS.
Ill. Ann. Stat., ch. 19, sec. 8 (Smith-Hurd Supp. 1973), as amended, act 78-718, sec. 6 (1973) Public Acts.

Descriptors: *Water law, *Illinois, *Canals, *Administrative agencies, *Legislation, Canal design, Conveyance structure, Engineering structures, Hydraulic structures, Water control, Structures, Dams, Locks, Rivers, Riparian rights, Land use, Management, Public rights, Ice, Navigation, Water rights, Water management(Applied).

The Illinois Department of Conservation is authorized to control and manage the Illinois and Michigan canal, including its feeders, basins, appurtenances, locks and dams in order to improve the navigation of the Illinois and Little Wabash rivers. The department shall have authority to hire personnel, prescribe reasonable rules and regulations in respect to all matters connected with the navigation and use of the canal, locks and dams and transportation on or through the same. Furthermore the department shall establish and collect reasonable rates of toll, sell and dispose of any machinery, fixtures, materials and personal property not required for the proper management, construction, repair and use of the canal, locks, dams and other improvements. The department may lease canal lands, elevators, adjoining state property, mineral rights and water power to the highest bidder when public notice is provided. The department may also lease to the highest bidder the exclusive rights to take ice from any waterway within its authority and sell or convey riparian rights or canal lands now owned by the state. (Silber-Florida)
W74-03990

FISHERMAN QUOTAS: A TENTATIVE SUGGESTION FOR DOMESTIC MANAGEMENT,
Rhode Island Univ., Kingston. Law of the Sea Inst.
F. T. Christy, Jr.
Occasional Paper Series, Occasional Paper No 19, November 1973. 7 p.

Descriptors: *Marine fisheries, *Commercial fishing, *Planning, *Permits, *Fish management, Fisheries, Fish conservation, Commercial fish, Fishing gear, Fishing.

If United States domestic fisheries are to economically rehabilitated drastic steps are required. Among these steps may be the establishment of some means to limit the amount of fishing effort. The suggestion for limiting fishing effort is not offered as a solution but as a basis for discussion. There are now two major approaches to the establishment of limits or control - a licensing system limiting the number of vessels in a fishery and a system of taxes or user fees to provide disincentives to entry into the fishery. A third approach suggested is the use of fisherman quotas. Each fisherman would receive a license entitling him to catch a certain share of the total yield from the stock of a fishery. Within certain conservation

constraints the quota holders should be free to use any kind of vessel, gear or technique desired. Problems of allocation of quotas, penalties for exceeding quotas and administrative procedures are discussed. Advantages and disadvantages are evaluated against assumed goals for the management of fisheries. (Comfort-Florida)
W74-03991

FLOOD DAMAGE PREVENTION-CONSTRUCTION OF BUILDINGS,
Ill Pub Acts (1973) ch 78-400, sec 1 to 5, to be codified as, Ill Stat, ch 85, sec 1711 to 1715.

Descriptors: *Flood protection, *Flood control, *Runoff, *Regulation, *Illinois, Rain, Snowmelt, Construction, Permits, Buildings, Legislation, Cities, Local governments, State governments, Flooding.
Identifiers: Water runoff.

Power is granted to municipalities to adopt ordinances which state requirements for building permit applications. The municipality is allowed to require building permit applications to contain a statement that such buildings and appurtenances connected therewith include facilities for the orderly runoff or retention of rain and melting snow. The ordinance can include a requirement that a licensed civil engineer sign a statement certifying that the plans include facilities adequate to prevent harmful runoff. (Daniels-Florida)
W74-03992

LEASING OF AREAS FOR CULTIVATION OF MARINE RESOURCES.
Me Rev Stat Ann, Ch 414, tit 12, sec 3721-3731 (Supp 72-73).

Descriptors: *Marine fisheries, *Aquatic life, *Coasts, *Maine, *Leases, Coastal plains, Shellfish, Legislation, Marine biology, Marine fish, Commercial shellfish, Shellfish farming, Contracts, Exploitation, Rent.
Identifiers: Marine resources, Coastal waters.

Leasing provisions are established for areas of Maine coastal waters for the cultivation of marine resources. The Commissioner of Sea and Shore Fisheries can issue leases if not in conflict with the Marine Coastal Plan for the harvesting and cultivation of marine fish of shellfish. Provisions and guidelines are established as to application for the leases, notice, area to be marked, grievances, rights, and renewal and revocation. Holders of leases for cultivation of any species on flats or land under coastal waters are entitled to take all of that species in the specified leased area. Any person who interferes with the enjoyment of any lease is subject to fines or imprisonment. No person (or corporation) is entitled to a total lease area of more than 200 acres or lease term longer than 10 years. (Daniels-Florida)
W74-03993

PETRUS V. ARKANSAS IRRIGATION CO. (INJUNCTION TO PREVENT INTERFERENCE WITH FLOWAGE RIGHTS).
499 SW2d 60 (Ark 1973).

Descriptors: *Reservoir operation, *Arkansas, Judicial decision, *Legal aspects, *Irrigation water, Water supply, Water costs, Reservoir management, Easements, Irrigation canals, Levees, Damage, Agriculture, Impoundments, Riparian rights.
Identifiers: Injunctive relief, Flowage rights.

For thirty years the plaintiff, an irrigation company, had maintained a six-thousand acre reservoir. The company used water from the reservoir in its own farming operations, and sold water to neighboring rice farmers. The company did not own the entire lakebed, but it had flowage rights upon lands lying below 207 feet mean sea level. The defendants owned land subject to the irrigation company's flowage easements. The defendants constructed levees to enclose twenty acres of their land subject to the flowage rights and installed a pump enabling them to withdraw water from the reservoir. In 1964, the plaintiff sued to require removal of the levees and the pumb, and for compensation for water pumped from the reservoir. The plaintiff prevailed. On appeal, the Supreme Court of Arkansas concerned itself with the actual or apparent authority of an agent of the plaintiff to enter into a contract with the defendant. This court affirmed the decision of the lower court, but remanded the question of damages. This question pertained to the fair rental value of the twenty acres, and the value of the water consumed. (Sperling-Florida)
W74-03994

HILLSBOURGH COUNTY ENVIRONMENTAL PROTECTION COMMISSION V. FRANDORSON PROPERTIES (DELIBERATE DESTRUCTION OF MANGROVES IN TIDAL WATERS NOT FORBIDDEN).
283 So 2d 65 (2nd DCA Fla 1973). 4 p.

Descriptors: *Florida, *Water pollution control, *Tidal waters, *Mangrove swamps, *Judicial decisions, Water pollution, Legislation, Pollution abatement, Legal aspects, Water law, Conservation, Shores.

Plaintiff sought to prevent defendant property developer's deliberate destruction of mangroves growing in tidal waters. The applicable statute prescribed water pollution in terms of depositing or permitting foreign substances to be discharged into waters. Plaintiff contended that the admitted mangrove destruction amounted to water pollution because of the loss of organic materials which had been produced by and were intimately associated with the living mangroves and had resulted in a deterioration of the ecological quality of the waters involved. The District Court of Appeal of Florida agreed that the destruction of the mangroves had caused severe ecological effects on the tidal waters, and stated that the Legislature possessed the power to forbid such destruction. The Court concluded, however, that this legislative provision was an attempt to define and prevent water pollution in terms of depositing or permitting foreign substances to be discharged into the waters, and that a fair reading would not permit the interpretation that it was enacted to forbid the destruction or removal of organic or inorganic materials already present in the water. (Ritchie-Florida)
W74-03996

SCHWERMANN V. REINHART (DRAINAGE DITCH CONSTRUCTION IN WILDLIFE CONSERVATION AREA).
210 NW 2d 33-37 (Minn 1973) 5 p.

Descriptors: *Judicial decision, *Drainage practices, *Drainage effects, *Ditches, *Marshes, Habitats, Cultivation, Drainage area, Drainage, *Minnesota, Legal aspects, Drainage system, Legal review, Ducks(Wild), Government, Wildlife conservation, Conservation, Public benefit.
Identifiers: Crop stabilization.

The petitioner, having secured the establishment of a drainage ditch by order of the county board, appealed from a Minnesota District Court's order overruling the board's order. The ditch would drain approximately 2,700 acres of which 100 acres are marshland which provide habitat and nesting areas for wild ducks. The lower court found that the marshy areas were a significant part of the wildlife-production area, that the addition of tillable land was irreconcilable with the federally financed crop-stabilization program, and that a large part of the flow from this area would be added to the flow of the Minnesota River. Considering these factors the trial court found the proposed ditch would be of no public benefit or utility. The Supreme Court of Minnesota reversed the decision and remanded. The Supreme Court found that the trial court abused its discretion in relying on the conservation issue in disallowing the establishment of the drainage ditch. (Gragg-Florida)
W74-03997

SOIL CONSERVATION DISTRICTS.
Tenn Code Ann, sec 43-1518 through 43-1519 (1955).

Descriptors: *Tennessee, *Legislation, *Water law, *Soil conservation, *Erosion controll, Land conservation, Land use, Land management, Land development, Cultivation, Drainage, Flood control, Watersheds, Farm management, Engineering, Erosion, Planting management.

Establishment is authorized of soil conservation districts with the power to conduct surveys, investigations and research relating to soil erosion and prevention and the control measures needed. The district also has the power to have these findings demonstrated and published, and to have the measures carried out within the district. The district may enter into agreements to carry out erosion control and prevention operations, to acquire property and maintain, administer and improve such property, and to make agricultural and engineering equipment, fertilizer, seeds and seedlings available to assist landowners in carrying out conservation of soil resources and for the prevention and control of soil erosion. The district shall formulate land-use regulations necessary to fulfill the purposes of this act, but must submit these to the district in a referendum. These projects may also include construction of terraces, check dams and like structures, the observance of particular cultivation methods, and specific cropping programs and tillage practices as well as retiring from cultivation highly erosive areas. (Silber-Florida)
W74-03998

SUPERVISION OF DAMS AND RESERVOIRS.
Conn Gen Stat Ann, sec 25-110, 25-112 (Supp 1972), as amended, act 73-571, sec 7, 8 (1973) Pub Acts of Conn.

Descriptors: *Connecticut, *Wetlands, *Dams, *Reservoirs, *Environmental effects, Legislation, Permits, Environment, Inland waterways, Construction, Watersheds(Basins), Dam construction, Dam design, Foundations investigations.

The Connecticut commissioner of environmental protection is authorized to enter upon private property to make investigations of dams, watersheds, sites and structures as may be necessary, for inspection of the design and construction of these structures. He is also empowered to gather data on the environmental impact of these structures on the inland wetlands of Connecticut. Before any such structure can be constructed, altered, added to, replaced or removed, the person or firm undertaking the work must apply to the commissioner for a permit. Plans, specifications and other data must be submitted to the commissioner, and upon his determination of the environmental impact upon the inland wetlands, he will issue a permit authorizing the proposed construction work under the conditions necessary to further the purposes of this act. (Ritchie-Florida)
W74-03999

INTERSTATE COMPACTS AND REGIONAL WATER RESOURCES PLANNING AND MANAGEMENT,
J. C. Muys.
Natural Resources Law, Vol 6, p 153-188, 1973. 99 ref, 5 append.

Descriptors: *Interstate compacts, *Interstate commissions, *Delaware River Basin Commission, *River basin commissions, *Institutions, Organizations, Interstate, Water resources development, Interstate rivers, Water law, Governments, Colorado River Compact, Equitable apportionment, Water policy, Administrative agencies, Management, Political aspects.

A survey is presented of the use of compact approach to contend with interstate water problems with suggestions for legislative action designed to facilitate the use of the compact mechanism in regional water resources management. A historical backgroung on the use of compacts, and an analysis of four different categories of compacts, leads to an evaluative discussion of the viability of comprehensive, regulatory and project development federal-interstate compacts. A detailed look at the Delaware River Basin Compact is the basis of optimism on the potential of the compact device, while the shortcomings of other compact efforts also are described. The compact mechanism affords the optimum permanent institutional approach to regional water problem. Specific recommendations for the Congress include: (1) advance consent should be granted to a limited class of compacts; (2) minimal conditions for future consent to all water compacts should be specified; (3) endorsement of the federal-interstate compact; (4) a statement of the relative roles of existing state and federal agencies with respect to interstate compact commissions; (5) supervision of, and cooperation with federal compact negotiators; (6) granting to federal district courts jurisdiction over all water compact matters. (Perrey-Florida)
W74-04000

KENTUCKY POLLUTION ABATEMENT AUTHORITY.
Ken Rev Stat Ann, sec 224A.010, 224A.020 (Supp 1973).

Descriptors: *Kentucky, *Grants, *Government finance, *Water pollution, Treatment, *Treatment facilities, *Water resources, Water treatment, Treatment, Sewage treatment, Water quality, Water supply, Legislation, Environmental effects, Pollution abatement, Water quality control, Water quality act.

Section 224A.010 lists and defines terms as used in chapter 224A of the Kentucky and enumerates its responsibilities and powers. The Kentucky legislature's findings of fact in regard to water pollution are set out in section 224A.020. Recognizing that the state's water resources are being injured by pollution, the legislature considers it essential for the state to actively engage in a program of assistance to governmental agencies to provide waste water treatment facilities. Additionally, the general assembly of Kentucky finds that in order to impose the minimum financial burden on its citizens, it must provide state aid to the construction and expansion of water treatment works in order to make use of federal grants-in-aid for that purpose. (Comfort-Florida)
W74-04002

SOIL AND WATER CONSERVATION COMMISSION: POWERS OF SUPERVISORS.
Ohio Rev Code Ann, sec 1515.08 (Supp 1972).

Descriptors: *Ohio, *Flood damage, *Flood protection, Water pollution control, Legislation, Water pollution, Pollution abatement, Regulation, Conservation, Permits, Construction, Environmental effects, Administrative agencies, Administration, Governments, Drainage systems, Damages, Flood control, Water resources planning act, Comprehensive planning, Water policy, State governments, Resources, Planning, Watershed management.

The supervisor of an Ohio water conservation district has the power to conduct surveys, investigations, and research of floodwater damage, preventive and control measures, and works of improvement of flood prevention. These may also be related to the conservation, development, utilization, and disposal of water needed within the district. The supervisor also has the power to develop, implement, construct, repair, and maintain works of improvement for flood prevention and disposal of water within the district. Supervisors are also involved in the funding of agricultural pollution and sediment pollution abatement. Supervisors must approve or disapprove all projects to be undertaken. The supervisor of a water conservation district submits annually to the division of water districts a work plan of any projects it plans to commence. The director of natural resources reviews and approves, disapproves, or makes recommendations on those projects having substantial environmental impact on the waters of two or more counties or states. Projects will be disapproved only if they adversely affect the environment, without equal or greater benefit to the public. (Sperling-Florida)
W74-04003

DEPARTMENT OF NATURAL RESOURCES--WATER RESOURCE.
Wis Stat Ann, sec 144.025 (1973).

Descriptors: *Legislation, *Water quality control, *Water resource planning, *Waste-water treatment, *Wisconsin, Water law, Administration, Natural resources, Planning, Long-term planning, Future planning, Water utilization, Water pollution control, Water pollution abatement, State governments.

The Wisconsin Department of Natural Resources shall serve as the state's central unit to protect, maintain and improve the quality and management of the waters of the state, ground and surface, public and private. It shall design a comprehensive action program directed at all present and potential sources of water pollution. The Department shall formulate a comprehensive state water resources plan for each region, which shall be reviewed and projected every two years with a report to the governor. The Department shall adopt rules setting water quality standards for the state to protect the public interest. The authority of the Department shall extend to waste treatment operations, well drilling on private property, chemical treatment of waters, interstate anti-pollution programs and energency orders. Hearings shall be provided for those interested, whenever possible. The Department may abate public nuisances, prohabit the installation of septic tanks in areas where their use would impair water quality and insure compliance of its lawful orders. There shall be a regional water resources board for each region which shall advise the Department on the regional water quality and pollution status. (Silber-Florida)
W74-04005

PLANNING AND ZONING-LAND SUBDIVISIONS.
Me Rev Stat Ann CH 14, Tit 30, sec 4956 (Supp 1973).

Descriptors: *Land use, *Water pollution, *Legislation, *Maine, *Planning, Sewage disposal, Soil erosion, Soil management, Discharges, Soil water movement, Regulation, Administration, Local governments, City planning, Water resources development.
Identifiers: Subdivisions.

Power to adopt subdivision regulations is vested in the various municipalities. However certain guidelines must be considered when regulations are promulgated and before approval is granted for a proposed subdivision. A determination must be made that the subdivision will not result in undue water pollution. In making this determination consideration must be given the elevation of land above sea level and its relation to the flood plains. The slope of the land and its effect on effluents and the availability of an adequate water supply must also be considered. Additionally all facets of waste disposal must be considered. (Daniels-Florida)
W74-04006

FRIENDS OF THE EARTH V. ARMSTRONG (ENVIRONMENTAL PROTECTION SUIT).
485 F 2d 1 (10th Cir 1973). 16 p.

Descriptors: *Environmental effects, *Reservoir releases, *National monuments, *U.S. laws and statutes, *Judicial decisions, Impounded waters, Environmental control, Reservoir operations, Water level fluctuations, Flow control, Economics, Electric power costs, Economic impact, Economic justification, Public lands, Public rights, Legal aspects, Constitutional law.
Identifiers: *Injunction.

The plaintiffs, non-profit environmental corporations and the head of a corporation which conducted river tours for profit, brought action for mandamus to have defendants take such action as would be necessary to prevent water being impounded in Lake Powell from spreading into any part of Rainbow Bridge National Monument. The Colorado River Storage Project Act of 1956 prohibited any water from Lake Powell entering any section of the national monument. Subsequent to the passage of this act, Congress denied budgetary requests for protective works with respect to Rainbow Bridge and specifically directed a prohibition against the use of money for such purposes. The defendants contended that the subsequent acts constituted Congress' implied repeal of the applicable sections of the Storage Project Act. The United States Circuit Court of Appeals overturned a lower court decision in favor of the plaintiffs and remanded the case basing its decision upon statutory construction and economic policy determinations based on the necessity of supplying electrical power. In its judgment, the court explained that the water depth under the bridge should not threaten its structure, but in acknowledging the possibility of unexpected damage, it would retain jurisdiction for ten years to allow future relief if necessary. (Proctor-Florida)
W74-04007

UNITED STATES V. TOBIN PACKING CO. (VIOLATION OF RIVERS AND HARBORS ACT).
362 F Supp 1127-1131 (ND NY 1973). 5 p.

Descriptors: *Rivers and Harbors Act, *Waste discharge, *Water quality, *Refuse, *Judicial decisions, Water Quality Act, Navigable waters, Waste disposal, Pollutants, Water pollution sources, Water law, Legal aspects, Pollution abatement, Water pollution control, Industrial wastes, Law enforcement, Penalties(Legal).
Identifiers: Estoppel.

The United States charged the defendant, a packing company, with fifty counts of violation of Section B of the Rivers and Harbors Act of 1899. The indictment consisted of the general accusation that the defendant caused refuse to be discharged into a tributary of navigable waters of the United States. The defendant moved to dismiss the indictment as insufficient or in the alternative to dismiss forty-nine of the asserted counts. After denying the motion to dismiss based upon insufficiency, the United States District Court in assessing the validity of the counts, explained that the approach of the act is not aimed at the polluting substance per se but at the acts of the polluter. The statute is meant to punish each separate act of discharging refuse. To sustain each count, the plaintiff must prove that each refers to some act which constituted a discharge on the dates listed. The court

asserted that a good faith attempt to meet the water quality standards imposed by the Water Quality Acts would not absolve liability under the Rivers and Harbors Act. It acknowledged, however, that the defendant could assert as a defense the fact that it had been misled by governmental agencies as to its discharging activities. (Proctor-Florida)
W74-04008

OHIO V. CALLAWAY (INJUNCTION ACTION FOR FAILURE TO COMPLY WITH NEPA).
364 F Supp 296-302 (SD Ohio, 1973). 7 p.

Descriptors: *Ohio, *Utilities, *Reservoir construction, *Impounded waters, *Water control, Water utilization, Impoundments, Reservoir sites, Surface waters, Water sources, Dams, Spillways, Flood control, Environmental effects, Reservoirs.
Identifiers: *Environmental Impact Statements, *National Environmental Policy Act of 1969, Injunctive relief, Public trust doctrine.

Plaintiff-state of Ohio sought to protect the public trust by seeking a preliminary injunction to enjoin the Secretary of the Army and other federal officials from executing additional contracts on a proposed and partially completed construction of reservoirs in the Ohio Valley. In addition state of Ohio sought to enjoin clear-cutting, removal of ground cover, or any other construction activity altering the natural environmental of the project area. The two reservoir projects had been funded, three contracts had been executed, and work was in progress to convert free flowing streams into impounding lakes behind spillways. The Army Corps of Engineers filed Environmental Impact Statements on the projects as required by the National Environmental Policy (NEPA). Defendant-Secretary of the Army admitted that the statements filed were below the 1973 standards for such statements. The United States District Court held that all federal agencies were obligated to comply with NEPA by preparing adequate environmental impact statements. The Court issued a preliminary injunction for the eight week remainder of the construction season, but allowed the three contracts already executed and in progress to continue to avoid penalizing the contractors. (Perrey-Florida)
W74-04009

UNITED STATES V. CANNON (INJUNCTION AGAINST VIOLATION OF RIVERS AND HARBORS ACT).
363 F Supp 1045-1052 (DC Delaware 1973). 8 p.

Descriptors: *Rivers and Harbors Act, *Wetlands, *Tidal marshes, *Landfills, Environmental engineering, Land development, Federal jurisdiction, Bulkhead line, Navigable waters, Riparian rights, Ownership of beds, Legal aspects, Permits.
Identifiers: Mean high tide mark, Injunction.

The U.S. government sought to enjoin defendants' filling of certain tidal marshes on land owned by the defendants which extends into a bay. Defendants did not obtain a permit to fill which the government contended was a violation of the Rivers and Harbors Act. The government contended that its jurisdiction extends beyond the mean high water mark to all portions of a tidal marsh adjacent to navigable water, including those portions which are not inundated at mean high tide. Defendants insisted that even those marsh areas covered by waters of a navigable bay at mean high tide are not navigable waters of the United States unless they are navigable in fact. In disposing of the government's motion for summary judgement, the court ruled that the government's jurisdiction in the water in question extends to its mean high water mark and not to areas above the mark which are occasionally inundated by the bay. Because of the material dispute of fact involved in the case, the court refused to issue summary judgment for the government. (Flowers-Florida)
W74-04010

UNITED STATES V. UNITED STATES STEEL (REFUSE ACT VIOLATION).
482 F. 2d 439 (7th Cir. 1973). 16p.

Descriptors: *Pollution abatement, *Rivers and Harbors Act, *Navigable waters, *Discharge, *Industrial wastes, Sewage, Oil wastes, Water pollution sources, Outflow, Wastes, Legislation, Legal aspects, Water pollution, Judicial decisions, Penalties(Legal), Water law.
Identifiers: Water Pollution Control Act 1948, Refuse Act of 1899, Water Quality Act of 1965.

Defendant was convicted of violation of the Refuse Act of 1899 for discharging refuse into the Calumet River. The act makes the discharging into navigable waters of any refuse matter of any description whatsoever without the permission of the Secretary of the Army a crime. Defendant's main contention was that the act requires an effect on navigation before permission is needed to discharge refuse and that the Secretary cannot decline to issue a permit for ecological reasons alone. The government made no attempt to show an effect on navigation. In upholding the conviction, the Seventh Circuit Court of Appeals noted that the words of the statute do not impose any limitation of an effect on navigation or a tendency to affect navigation on the refuse matter covered. Legislative history does not show that the statute means anything other than what it says. Discharge of any refuse matter, regardless of any apparent effect on navigation, is prohibited in the absence of a permit even if Congress thought at the time of enactment that permits would not, or could not be withheld on grounds that the material discharged was merely a pollutant. (Flowers-Florida)
W74-04011

CHICAGO AND NORTH WESTERN RAILWAY COMPANY V. TYLER (DAMAGE ACTION CAUSED BY FLOODING WATERS).
482 F. 2d 1007-1011 (8th Cir. 1973). 5p.

Descriptors: *Dam failure, *Disasters, *Flood damage, *Act of God, Judicial decisions, Legal aspects, South Dakota, damages, Floodings, Water law, Structures, Concrete dams, Transportation, Storms, Dams.

The action stems from the damage of several railroad cars derailed from extreme flooding of the tracks after a heavy rainfall and the collapsing of a nearby conservation dam. The plaintiff railroad company advanced three theories for damage recovery: negligence, strict liability and 'absolute nuisance.' The defendant denied strict liability pursuant to state law, and his own negligence and advanced contributory negligence and argued that an Act of God was solely responsible. The District Court found for the defendant, and the plaintiff appealed to the United States Circuit Court which affirmed. The Circuit Court found all instructions on the pleas advanced were correct and from the facts presented there was no clearly erroneous cause shown for reversal. As the conservation dam was common in use and appropriate in setting in the locale, both the strict liability and 'absolute nuisance' were unfounded theories for recovery. An as the facts showed the rainfall to be extremely heavy for the time and area, and as there was widespread flooding from various sources, not only the dam, the Act of God defense was clearly applicable. The Circuit Court also advanced the opinion, in dicta, that the jury verdict could possibly have been due to a finding of negligence on the railroad's part in operating its trains. (Sutton-Florida)
W74-04012

CONSERVATION, GEOLOGY AND WATER RESOURCES,
Fla. Stat., sec. 373.011 through 373.241 (1971).

Descriptors: *Florida, *Saline water intrusion, *Water conservation, *Water resources development, Water supply, competing uses, Water demand, Water sources, Artificial recharge, Confined water, encroachment, Mineral water, Channel improvement, Administrative agencies, Public health, Environmental effects, Legislation, Water resources planning act, Groundwater resources, subsurface waters, Water quality, Water utilization, Administration, Resources.

These statutes concern the Florida Division of Interior Resources, its powers and functions. The division has the power to requisition needed monies from the treasurer. The duties of the division include a report of the state. The report must contain a full description of such surveys and exploration, occurrences and location of mineral deposits, surface and subterranean water supply, mineral waters, and the best and most economical method of development. There are also certain procedures to be followed when dealing with artesian wells such as capping. The Water Resources Law declares the policy of the state to be the maintenance, protection, and conservation of the water resources of the state. To implement this goal the division is given power to capture, store, and regulate the use of water resources as well as supervise local water regulatory districts. This power is exercised in accordance with notice and hearing requirements and is subject to judicial review. (Sperling-Florida)
W74-04013

DRAINAGE.
Fla. Stat. Ann., sec. 298.01, 298.02, 298.03, 298.07, 298.08, 298.09, 298.11, 298.15, 298.16, 298.17, 298.22 (Supp. 1973).

Descriptors: *Florida, *Drainage systems, *Flood control, *Flow augmentation, Water distribution(Applied), Public health, Dikes, Legislation, Standards, Regulation, Watershed management, Consevation, Natural resources, Construction, Administrative agencies, Administration, State governments, Levees, Dams, Water management.

To form a water-management district, the Florida department of natural resources, or a majority of the owners of the lands in the district may make and sign a petition which should contain the name of the district, the proposed life of the district, the boundary line of the proposed district, the names of owners of lands in the district and contiguous to it, the feasibility of a special assessment procedure, and that the proposed district is in the public interest. Public notice of the petition and a hearing for objections to the formation of the district are required. Aslo, by petition to the court and with a hearing for objections, districts may be consolidated or the life of districts extended. Supervisors in each district are elected by the landowners in each district, and the department of natural resources may vote, to the extent they have property in the district. The supervisors of each district will keep a record of the meetings, appoint a chief engineer and treasurer, and fix compensation for employees. The supervisors are given broad powers to effect the drainage, protection, and reclamation of the land in district. (Sperling-Florida)
W74-04014

WATER POLLUTION CONTROL.
Vt. Stat. Ann., Title 10, sec. 910-920. (1970)

Descriptors: *Vermont, *Legislation, *Water law, *Sewage, *Sewage disposal, *Sewage treatment, *Waste water disposal, Water pollution sources, Waste treatment, Water pollution control, Abatement, Industrial wastes, Municipal wastes, Waste

disposal, Environmental sanitation, Waste water treatment, Permits, Water quality, Water quality standards.

Any person who is discharging treated or untreated wastes into waters of the state shall file a written report of such discharges with the Vermont Water Resources Department together with an application for a discharge permit. If the department finds that the discharge will reduce the quality of the receiving waters below the standards established it shall not issue a permit. A discharge permit shall state the manner and frequency of permissible discharges, any required pollution abatement facility necessary in the treatment or processing of the waste and any additional conditions necessary to preserve and protect the receiving water's quality. When an applicant does not qualify for a discharge permit, the department may issue a temporary pollution permit. This permit shall be valid only for the time necessary to place into operation a facility or system which will qualify for a discharge permit. The department may revoke any permit upon findings of violation of any conditions or standards of the permit issued. The authority of the department extends to the operation and regulations of municipal sewage treatment plants. (Silber-Florida)
W74-04015

CONSERVATION--REGULATION OF STREAMFLOW.
Vt. Stat. Ann., Title 10, sec. 651-654. (1970)

Descriptors: *Water law, *Legislation, *Stream flow, *Stream flow regulations, *Stream flow alteration, *Dams, Diversion, Water management, Water resources development, Diversion structures, Flood control, Riparian rights, Administration, Coordination, Maintenance, Water policy, Vermont, Water, Flow, Streams, Structures.

The Vermont water resources board (board) is responsible for the proper administration of the water resources of the state. This requires careful consideration of the interruption of the natural flow of water resulting from construction and operation of dams and other control structures. Corrective actions shall be taken to assure continuous flow of waters in the natural water courses consistent with riparian rights. Whenever the board determines that the maintenance of some artificial restriction of streamflow threatens the public interest or welfare, it may recommend that action be taken by the person owning the dam to release the water considered necessary and proper in the public interest. The board shall be the state's agent in coordinating the state's interest before the federal power commission in all matters involving regulation or control of natural stream flow through the use of dams situated on streams within the boundaries of the state. (Silber-Florida)
W74-04016

LITTERING OF PROPERTY AND WATERS.
Mich. Comp. Laws Ann., sec. 752.901, 752.903 (1967), as amended, act 54, sec. 1 (1973) Mich. Pub. Acts.

Descriptors: *Michigan, *Water pollution control, Environmental sanitation, *Litter, Legislation, Water pollution sources, State governments, Pollution abatement, Pollutants, Water quality control, Regulations, Aesthetics, Wastes.
Identifiers: *Water pollution(Litter).

In the state of Michigan it is illegal, without the approval of some public authority, to dump, deposit, place, throw or leave, or cause or permit the dumping deposition of litter on any waters. 'Waters' includes, but is not limited to, any body of water, watercourse, shores or beaches, as well as the ice above such water. The penalty that can be imposed for this misdemeanor includes, in lieu of sentence, the imposition of litter-gathering labor. There is a maximum fine of $400.00 plus costs, and the maximum jail term is ninety days. (Sperling-Florida)
W74-04017

SUPERVISION OF OIL, GAS, AND NATURAL DRY GAS WELLS.
Mich Comp Laws Ann, sec 319.2, 319.3, 319.6, 319.18a, 319.18b (Supp 1973), as amended, act 61, sec 1, (1973) Mich Pub Acts.

Descriptors: *Michigan, *Well permits, *Well regulations, *Legislation, *Water pollution control, Wastewater, Drilling, State governments, Oil wells, Brine disposal, Gasoline, Natural gas, Oil pollution, Oil wastes, Water pollution, Water pollution sources.

Under section 319.3 the director of the Michigan department of natural resources is given the power to act as the supervisor of wells. Under section 319.6, the supervisor is empowered to prevent waste occurring in connection with the drilling process. He is specifically empowered to require drillers to conduct their operations so as to prevent escape of water into oil or gas strata; to prevent pollution, damage to or destruction of fresh water supplies including lakes and streams and the Great Lakes and connecting waters; and to require the disposal of salt water and brines and oily wastes in such a manner that no unnecessary damage is done to surface or underground resources. In addition, when an operator is found to be in violation of any rules enacted under these statutes, compliance can be forced and any resultant costs charged to the owner. (Flowers-Florida)
W74-04018

EMINENT DOMAIN.
Fla. Stat., sec. 361.04 (1971).

Descriptors: *Legislation, *Statute, *Eminent domain, *Adjacent landowners, *Water supply, Condemnation, Legal aspects, Dependable supply, Potential water supply, Lakes, Ponds, Administration, Florida, Water supply development, Water pollution, Surface waters, Subsurface waters.

The power of eminent domain is given to water works companies organized under the general or special laws of the state of Florida. If necessary to its contemplated business of supplying water a water works company may enter upon and appropriate to its use any land, public or private, provided that the company makes due compensation according to law to private owners. A duly organized water works company may also take from land convenient to its works any materials necessary for constructing, operating, keeping in repair or preserving such works upon making due compensation. If any part of the company's supply of water is derived from any lake, pond, or stream, whether surface or subterranean, it may appropriate any land lying contiguous to the body of water necessary to preserve or protect the water from diversion or contamination upon making the specified compensation. (Sutton-Florida)
W74-04020

CZARNICK V. LOUP RIVER PUBLIC POWER DISTRICT (LIABILITY OF POWER DISTRICT FOR DAMAGE RESULTING FROM NEGLIGENCE).
209 N.W. 2d 595-600 (Nebraska 1973). 6 p.

Descriptors: *Judicial decision, *Diversion, *Alteration of flow, *Flood damage, *Nebraska, Channels, Flooding, Legal aspects, Erosion, Diversion structure, Dikes, Excavation, Water law, Governments, Easements, Penalties, Soil erosion, Rivers.

The plaintiff landowner brought action for damages and injunctive relief with respect to flooding of his farmland. The action was brought against the Loup River Power District which had granted an easement to the state of Nebraska. The state of Nebraska was also joined as a defendant for constructing upon said easement a channel cut which diverted the course of the Loup River which in turn caused the flooding of plaintiff's land. The Supreme Court of Nebraska dismissed the action against the Power District because the plaintiff failed to prove negligence in the Power District's grant of the easement. The court also dismissed the damage claim against the state because the statute of limitations had expired. The court remanded for consideration the question of the injunction, finding that plaintiff's complaint alleged sufficient facts in support of his request for equitable relief. The court found that injunctive relief was not barred by the statute of limitations. (Gragg-Florida)
W74-04021

JURISDICTIONAL PROBLEMS CREATED BY ARTIFICIAL ISLANDS.
San Diego Law Review, Vol 10, No 3, p 638-663, May 1973. 138 ref.

Descriptors: *International waters, *Law of the sea, *Engineering geology, Foreign waters, Electric power production, Airports, Political aspects, Boundaries(Property), State jurisdiction, Continental shelf, Water resources, Federal jurisdiction, Foreign countries, International law, Beds under water, Legal aspects.
Identifiers: *Artificial islands, *Territorial waters, *Contiguous zone, Legal vacuum, Coastal states.

The need and ability to make artificial islands are discussed. Past attempts at the creation and maintenance of artificial islands are described. The creation of artificial islands has been proposed for a variety of purposes including cities, atomic power plants, superports, and jetports. A review of United States law relevant to artificial islands is made but is limited to artificial islands which are used for exploiting the natural resources of the continental shelf. One difficulty is the lack of consensus between coastal states' claims to their territorial sea boundary. The possible exercises of jurisdiction over artificial islands in international waters, and the customary freedom of the high seas are discussed. This freedom has already been curtailed in the Convention on the Continental Shelf where coastal states are given exclusive jurisdiction over the shelf for the limited purpose of the exploitation of natural resources. Basing jurisdiction over artificial islands on existing concepts of international law is discussed. One such concept is the legal vacuum theory. A suggestion for dealing with artificial islands other than those on the continental shelf is the creation of an international regime. (Sperling-Florida)
W74-04022

A HARBINGER: THE SENKAKU ISLANDS.
San Diego Law Review, Vol 10, No 3, p 664-691, May 1973. 81 ref.

Descriptors: *Oil industry, *International waters, *Geology, *Law of the sea, *International law, Foreign waters, Foreign countries, Oil exploitation, Political aspects, Boundaries(Property), State jurisdiction, Legal aspects, Jurisdiction.
Identifiers: Coastal zone management, Coastal waters, International court.

Conflicting claims have been made on the Senkaku Islands following the discovery of oil. Involved are two questions, namely which state holds sovereignty over the islands and which state holds the right to the natural resources of the seabed in the vicinity of these islands. The discussion deals with solutions and alternatives to present law that could resolve the controversy and avoid future

conflicts. The Japanese and Chinese claims are discussed. Also discussed are the North Sea cases and proceedings in the International Court. The petroleum industry is also very interested in the outcome, but because of dissension the industry has never formulated much more than a laissez-faire attitude. President Nixon drafted a treaty reflecting principles in a United Nation's resolution proposing an international regime. The proposal, its weaknesses, and possible alternatives are described. (Sperling-Florida)
W74-04023

THE FUTURE OF WATER QUALITY CONTROL,
For primary bibliographic entry see Field 5G.
W74-04026

OFFENSES CONCERNING PUBLIC ROADS AND NAVIGABLE WATERS.
Fla. Stat. Ann., 861.02, 861.021, 861.03, 861.04, 861.05, 861.06 (Supp. 1972).

Descriptors: *Florida, *Legislation, *Statute, *Navigable waters, *Transportation, Obstruction to flow, Streamflow, Water law, Roads, Law enforcement, Legal aspects, Regulations, Administration, Pollution control, Dams, Bridges, Channels.

These statutes set penalties, both felonies and misdemeanors, for offenses which affect public roads and navigable waters. They deal with obstructing water courses with dams, bridges, and other such structures (section 861.02), and also by obstructing marked channels with traps and nets (section 861.021). Other statutes, also concerned with water obstructions, cover injuring dams (section 861.03), the placing of water hyacinths (section 861.04), obstruction by bridge construction (section 861.05), and obstructing harbors (section 861.06). (Sutton-Florida)
W74-04029

SAFE DRINKING WATER ACT OF 1972--S.3994.
For primary bibliographic entry see Field 5G.
W74-04030

HIGH SEAS INTERVENTION: PARAMETERS OF UNILATERAL ACTION,
R. P. Cundick.
San Diego Law Review, Vol 10, No 3, p 514-558, May 1973. 105 ref.

Descriptors: *Law of the Sea, *International law, *Oil pollution, *Legal aspects, Foreign waters, International waters, Oil industry, Water pollution sources, Water pollution effects, Shore protection, Oil spills, Water law, Coasts, Seashores.
Identifiers: *Intervention.

Intervention is action taken against a vessel to prevent or mitigate damage to coastal interests, unaccompanied by a threat to the internal or external affairs of the flag state. There is a conflict between nations' interests in free shipping of vital goods and coastal nations' interests in keeping their coasts free from oil spills and their resultant consequences. An increased number of spills which have prompted both unilateral and multilateral action have shown the need for effective legal procedures. The situation is analyzed as it now exists under international law, and the justification for action on the high seas is also discussed. Two particular experiences are analyzed, one involving Great Britain and the Torrey-Canyon and the other, South Africa and the Liberian tanker Wafra. An International Oceans Policy is needed. The duty and responsibilities of intervention are emphasized. The International Law rule of reasonableness in action and reaction should be used. (Sperling-Florida)
W74-04031

THE OCEAN DUMPING CONVENTION--A HOPEFUL BEGINNING,
For primary bibliographic entry see Field 5G.
W74-04032

WATER COMMISSION ENDORSES USER PAY CONCEPT,
Arkansas Wildlife Federation, Inc., Dardanelle.
K. Hampton.
Arkansas Out-of-Doors, Vol 2, No 8, p 2, 11, August 1973. 2 photo.

Descriptors: *Water resource planning, *Water conservation, *Water development, *Water rights, *Water control, Land use, Land management, Water quality control, Flood control, Riparian rights, Wildlife conservation, Payment, Cost repayment, Water utilization, Water supply.

In its final report the National Water Commission emphasized the need to protect the environment by coordinating land use and water planning functions. Among its recommendations were more efficient use of water in agriculture and industry, reduction of municipal and domestic waste, updating laws to successfully implement future water policies and controlled development, management and protection of water resources. The Commission recommends that identifiable beneficiaries of water programs and projects be required to pay the costs of developments which give them economic benefits. The report indicates that there is presently enough water to meet essential needs, but not enough to waste. The Commission feels that the emphasis on water development should shift to water preservation and quality control. One improvement thought immediately necessary is to establish procedures for recording and transferring water rights and a development of effective riparian and water use laws, especially in the eastern states. Also emphasized is the need for better flood control provisions, channelization of streams, and adequate safeguards against water pollution as well as insuring the conservation of fish and wildlife dependent upon water resources. (Silber-Florida)
W74-04036

DEVELOPMENTS IN WATER UTILITY LAW, 1972-1973, AMERICAN BAR ASSOCIATION REVIEW.
For primary bibliographic entry see Field 5G.
W74-04037

PAASCH V. BROWN (DAMAGES FROM OBSTRUCTION OF WATER FLOW BY LOWER LANDOWNER).
208 N.W. 2d 695-698, (Neb. 1973). 4 p.

Descriptors: *Nebraska, *Legal aspects, *Surface waters, *Obstruction to flow, Stream, River, Snowmelt, Rainfall, Diversion structures, Judicial decisions, Drainage, Drainage effects, Repulsion(Legal aspects), Relative rights.
Identifiers: Injunction.

Plaintiff, upper landowner, brought suit for injunctive relief and damages against lower landowner who plaintiff contended had obstructed the flow of surface waters in a natural drainway that was not a stream, river, brook or watercourse. The Supreme Court of Nebraska granted injunctive relief. The Court held that diffused surface waters, which result from rainfall and melting snow and have no permanent source of supply or regular course, may be dammed, diverted, or otherwise repelled by an adjoining landowner without liability, if it is necessary and done without negligence. However, when surface waters concentrate and gather in volume, so as to lose their character as diffused surface waters, and flow into a natural depression, draw, swale, or other natural drainway, the flow may not be arrested or interfered with to the injury of neighboring proprietors. (Sears-Florida)
W74-04039

IMPROVING WATER QUALITY MANAGEMENT PLANNING IN NONMETROPOLITAN AREAS.
National Area Development Inst. of Spindletop Research Inc., Lexington, Ky.
For primary bibliographic entry see Field 5G.
W74-04199

SOME ASPECTS OF THE THEORY OF EXPLOITATION OF FISH RESOURCES, (IN RUSSIAN),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
For primary bibliographic entry see Field 8I.
W74-04278

6F. Nonstructural Alternatives

COMMUNITY WELL-BEING AS A FACTOR IN URBAN LAND USE PLANNING,
Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
For primary bibliographic entry see Field 6B.
W74-03751

AN EVALUATION OF URBAN FLOOD PLAINS,
J. E. Goddard.
Availability from NTIS as PB-227 337 $3.25 in paper copy, $1.45 in microfiche. American Society of Civil Engineers Urban Water Resources Research Program Technical Memorandum No 19, New York, NY, December, 1973, 40 p, 2 fig, 7 tab, 10 ref. OWRR C-4048(No 9009)(2). OWRR 14-31-0001-9009.

Descriptors: *Flood plains, *Urbanization, United States, *Land use, *Capital investment, *Flood damage, *Implied benefits, Federal project policy, Flood protection, Storm drains, *Cities, Evaluation.
Identifiers: National assessment, National sample, Flood plain occupancy, Flood control works, Integrated management.

Using 26 'Urban Areas' with populations ranging between 50-thousand and 7-million persons as a national sample, close to one-sixth of urban lands in the U.S. lie within natural 100-year flood plains, and slightly over one-half of such flood plains already have been developed. Average annual flood damages for urban areas may be about three-fifths of the national total. Slightly over half of the national investment in flood control works have been for the protection of urban areas. Information available does not permit estimation of implied benefits. In comparison, well over one-half of urban lands are served by systems of underground drainage that represent over four times the capital investment in flood plain protection and are associated with approximately the same level of average annual flood damages. Much of the floodplain flooding as well as the land-runoff water quality problem could possibly be more effectively countered on the land feeding urban watercourses, provided planning and development of drainage systems and flood plain management programs can be coordinated and integrated. Specific recommendations are made on acquisition of needed information. There are implications for emerging national water policies. (McPherson-ASCE)
W74-03756

6G. Ecologic Impact Of Water Development

COMMON PROPERTY, CONGESTION, AND ENVIRONMENTAL POLLUTION,
Wisconsin Univ., Madison. Dept. of Economics.
R. H. Haveman.
Quarterly Journal of Economics, Vol 87, No 2, p 278-287, 1973. 7 ref.

Descriptors: *Welfare(Economics), *Environment, *Pollutants, *Graphical analysis, Economic efficiency, Real costs.
Identifiers: *Common property, Congestion, Environmental pollution, Externalities, Social costs.

Problems of congestion and pollution are typically lumped together under the titel common property resource problems. While these problems have in common nonappropriability and inequality of marginal social costs and benefits at equilibrium the theoretical nature of resource misallocation in the pollution, congestion, and common property cases differ. In the common property case, excessive output is stimulated by the negative user costs which are generated by the existence of producers' quasi-rents, not appropriated under free entry. In the congestion case, overuse is encouraged because all crowding costs by users are not reflected in their marginal use decisions. In both cases, resource misallocation and welfare loss is limited, with resource use stopped before net economic welfare generated by the activity reaches zero. In the pollution case, the residual effects of the consumption or production activity are typically not borne by the producer. Pollution costs do not enter into the consumption or production decision of the producer at all, leaving the equilibrium output level the same, with or without the pollution. As a result, the net economic surplus of the activity may be negative in the pollution case, a result not possible under the other two. (Schroeder-Wisconsin)
W74-03958

THE POLLUTION SUB-SYSTEM,
. K. Marstrand, and T. C. Sinclair.
Futures, Vol 5, No 1, p 80-89, 1973. 1 fig, 13 ref.

Descriptors: *Forecasting, *Systems analysis, Analytical techniques, Methodology, *Model studies, Absorption.
Identifiers: World 3 pollution subsystem, Pollution effects.

The World 3 pollution subsystem has drawn increasing public attention. The model predicts that pollution grows at the same rate as industrial and agricultural output, resulting over time in a catastrophe. Because the model is based on limited data, it may reflect preconceptions which distort its results. The model's assumptions and their effects are examined. The model assumes pollution entering the biosphere over time arises from industrial or agricultural activities. The higher the level of pollution, the greater the absorption rate. Conversely, the rising level lengthens the absorption time, depressing the rate. This dynamic behavior is invalid for some pollutants which might enter the biosphere immediately or which may have differing effects on the absorption rate. Also dubious were the assumptions that pollution absorption and generation were equal in 1900 and that the maximum upper pollution limits would occur when levels reached 25 times that of 1970. More disturbing are the model's dismissal of the effects of consumer activities, its assumption that pollutants are evenly distributed over space, and its failure to account for possible technical change. The model, with its predictions of catastrophe, may do a disservice by shifting attention away from solvable social problems. (Schroeder-Wisconsin)
W74-03964

TEMPORARY NAVIGATION LOCK MODIFICATION OF LOCK AND DAM 53) FINAL ENVIRONMENTAL IMPACT STATEMENT), OHIO RIVER, ILLINOIS AND KENTUCKY.
Army Engineer District, Nashville, Tenn.
For primary bibliographic entry see Field 8A.
W74-03966

CLEANING UP A RIVER,
For primary bibliographic entry see Field 5G.
W74-03968

OAKLAND INNER HARBOR, ALAMEDA COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 8A.
W74-04027

ESTUARIES UNDER ATTACK,
Oregon State Univ. Extension Service, Corvallis. Marine Advisory Program.
W. Q. Wick.
Water Spectrum, Vol 5, No 3, p 12-18, 1973. 6 p, 4 photo.

Descriptors: *Aquatic habitats, *Saline water, *Estuarine environment, *Estuaries, *Ecology, Oil industry, Commercial fishing, Mixing, Environmental control, Estuarine fisheries, Encroachment, Bays, Oceans, Oregon, Gulfs, Aquatic environment, Intertidal areas, Saline water-freshwater interfaces, Sea water.

The value conflict over estuaries is discussed. The conflict is between the environmentalist on one hand and the industrialist on the other. A mutual compromise from both sides is supported. Both the ecological need to preserve the estuary and man's need to eat and progress are emphasized. Human needs are outlined and ecological desires are stressed. Five qualities crucial to the biological productivity of estuaries are suggested. A dynamic process centered around getting the citizens of the community deeply involved in all stages of planning and operation is proposed. The Estuary Planning Guidelines put out in 1973 by the Oregon Coastal Conservation and Development Commission are one way of gaining community support. The Coastal Zone Management Act could provide Federal impetus and support to the conflict. A positive approach is emphasized with community support in land and water use plans, zoning ordinances and sample development projects. However the urgency of action now is stressed. (Sutton-Florida)
W74-04033

THE ENVIRONMENTAL COST OF ECONOMIC GROWTH,
Washington Univ., St. Louis, Mo. Center for the Biology of Natural Systems.
For primary bibliographic entry see Field 5G.
W74-04088

7. RESOURCES DATA

7A. Network Design

THE DESIGN OF THE MONITORING SYSTEM FOR THE THERMAL EFFECT STUDY OF THE SURRY NUCLEAR POWER PLANT ON THE JAMES RIVER,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 5B.
W74-04246

7B. Data Acquition

INTEGRATED MEASUREMENT OF SOIL MOISTURE BY USE OF RADIO WAVES,
Utah State Univ., Logan. Coll. of Engineering.
For primary bibliographic entry see Field 2C.
W74-03772

EVALUATION OF WATER FLUX ABOVE A DEEP WATER TABLE USING THERMOCOUPLE PSYCHROMETERS,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 2G.
W74-03776

VACUUM EXTRACTORS TO ASSESS DEEP PERCOLATION LOSSES AND CHEMICAL CONSTITUENTS OF SOIL WATER,
Agricultural Research Service, Fort Collins, Colo.
H. R. Duke, and H. R. Haise.
Soil Science Society of America Proceedings, Vol 37, No 6, p 963-964, November-December 1973. 3 fig.

Descriptors: *Percolation, *Infiltration, *Sampling, *Instrumentation, *Infiltrometers, *Soil moisture meters, Soil water.

A vacuum extractor, consisting of a porous ceramic tube within a sheet-metal trough, provides a quantitative measure of soil water lost by deep percolation and a water sample for chemical analysis. Several of these extractors were installed in the field and preliminary field performance is reported. (Knapp-USGS)
W74-03779

WATER-SEDIMENT SPLITTER FOR RUNOFF SAMPLES CONTAINING COARSE-GRAINED SEDIMENT,
Agricultural Research Service, Watkinsville, Ga.
For primary bibliographic entry see Field 2J.
W74-03780

APPLICATION OF REMOTE SENSING TO RIVER MECHANICS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-03800

FLOODS IN IOWA: TECHNICAL MANUAL FOR ESTIMATING THEIR MAGNITUDE AND FREQUENCY,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 4A.
W74-03805

PIEZOELECTRIC PRESSURE TRANSDUCERS.
Measurements and Data, Vol 7, No 5, p 92-98, September/October 1973. 18 fig, 1 tab.

Descriptors: Pressure, Measurement, Electrical equipment, *Instrumentation.
Identifiers: *Pressure transducers, *Piezoelectric transducers, Sensors.

The theory piezoelectric transducers is reviewed, and manufacturers, types of pressure tranducers and their sensitivity, range, frequency response, special capabilities, and price are listed. (Little-Battelle)
W74-03870

APPLICATION OF A NEW METHOD FOR PHOSPHATE CONCENTRATION MEASUREMENTS IN NATURAL AND WASTE WATERS,
Wisconsin Univ., Milwaukee. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-03900

WEST SIDE CROP ADAPTABILITY STUDY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 3F.
W74-03922

LOSS OF MERCURY FROM WATER DURING STORAGE,
Environmental Health Lab., McClellan AFB, Calif.
For primary bibliographic entry see Field 5A.
W74-04048

GELATIN COATED MICROSCOPE SLIDES IN SEDIMENTARY SIZE ANALYSIS,
Brock Univ., St. Catharines (Ontario). Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W74-04055

MEASURING VOLUMES OF SEDIMENTARY GRAINS,
Puerto Rico Univ., Mayaguez. Dept. of Geology.
For primary bibliographic entry see Field 2J.
W74-04056

APPARATUS FOR STUDIES OF ARTIFICIAL SEDIMENTS,
Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia). Baas-Becking Geobiological Lab.
For primary bibliographic entry see Field 2J.
W74-04057

DETERMINATION OF ORGANIC CARBON IN MODERN CARBONATE SEDIMENTS,
Geological Survey, Denver, Colo. Office of Energy Resources.
For primary bibliographic entry see Field 2J.
W74-04059

ABSORPTIOMETRIC DETERMINATION OF TRACE AMOUNTS OF SULPHIDE ION IN WATER,
Mosul Univ. (Iraq). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W74-04072

AN ELECTROCHEMICAL METHOD FOR MONITORING THE OXYGEN CONTENT OF AQUEOUS STREAMS AT THE PART-PER-BILLION LEVEL,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-04104

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE MONTICELLO NUCLEAR GENERATING PLANT, MONTICELLO, MINNESOTA, AUGUST 1970.
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W74-04185

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING BIG ROCK POINT NUCLEAR PLANT, BIG ROCK POINT, MICHIGAN, 1968,
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5B.
W74-04186

AERIAL DETECTION OF SPILL SOURCES,
McDonnell Aircraft Co., St. Louis, Mo. Reconnaissance Lab.
For primary bibliographic entry see Field 5A.
W74-04196

EXPLICIT CALIBRATION OF THE PILLS II SYSTEM,
Environmental Systems Corp., Knoxville, Tenn.
For primary bibliographic entry see Field 5D.
W74-04198

ASSESSMENT OF COASTAL CHANGES WITH THE AID OF PHOTOGRAMMETRIC AND COMPUTER-AIDED TECHNIQUES,
University Coll. of Wales, Aberystwyth. Dept. of Geography.
C. Kidson, and M. M. M. Manton.
Estuarine and Coastal Marine Science, Vol 1, No 3, p 271-283, July 1973. 8 fig, 3 plate 22 ref.

Descriptors: *Geomorphology, *Coasts, *Photogrammetry, *Aerial photography, Beaches, Intertidal areas, Mud flats, Shores, Topography, Tides, Mapping, Terrain analysis, *Remote sensing, *Bays.

The study of landforms can easily take advantage of photogrammetric techniques. The coast and the nearshore zone include landforms where the operation of both marine and terrestrial processes produce changes more rapidly than elsewhere. At the same time this interface between land and sea also introduces special difficulties in topographic survey and the recording of changes. Examples are taken from the southwest peninsula of England. At Bridgwater Bay, Somerset, a low marsh coast is fronted by a very wide intertidal zone because the tidal range is one of the highest in the world. This introduces problems which only photogrammetry can adequately solve. Deep mud inhibits conventional ground survey and problems of access make interpretation of foot a matter of great difficulty. In Barnstaple Bay, a rocky coast with steep cliffs and relatively narrow shore platforms cut in steeply dipping rocks causes contrasting problems and solutions. (Knapp-USGS)
W74-04271

7C. Evaluation, Processing and Publication

THE OPTIMAL EXPANSION OF A WATER RESOURCES SYSTEMS,
Texas Univ., Austin. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 6A.
W74-03754

SUSPENDED-SEDIMENT SAMPLING VARIABILITY,
Geological Survey, Fort Collins, Colo.
For primary bibliographic entry see Field 2J.
W74-03801

FLOOD PROFILES IN THE UMPQUA RIVER BASIN, OREGON, PART 2,
Geological Survey, Portland, Oreg.
For primary bibliographic entry see Field 4A.
W74-03803

WATER RESOURCES OF THE NORTHERN CHEYENNE INDIAN RESERVATION AND ADJACENT AREA, SOUTHEASTERN MONTANA,
Geological Survey, Washington, D.C.
W. B. Hopkins.
For sale by USGS, Washington, D.C. 20242 Price $1.00 per set. Hydrologic Investigations Atlas HA-468, 1973. 2 sheets, 2 maps, 2 tab, 6 ref.

Descriptors: *Water resources, *Hydrologic data, *Water yield, *Water quality, *Montana, Hydrology, Surface waters, Groundwater movement, Precipitation(Atmospheric), Streamflow, Runoff, Flow rates, Water wells, Hydrogeology, Aquifer characteristics, Chemical analysis, Water utilization, *Indian reservations, *Maps.

Water resources of the Northern Cheyenne Indian Reservation, Montana, and adjacent area are described in terms of sources, amounts available, and quality. The study area includes about 2,500 square miles of the unglaciated Missouri Plateau part of the Great Plains province in southeastern Montana. Present water use is small as only about 2,500 people live on the reservation, and approximately 1,000 more live on ranches in the rest of the area. The average annual precipitation from 1960 through 1968 was 14.47 inches. Wells and springs yield water for domestic or stock supplies from the alluvium in stream valleys; from clinker beds, sandstone and coal beds in the Tongue River Member of the Fort Union Formation; and from sandstone beds in the Hell Creek Formation. Wells that would yield more than 50 gpm would be limited to the alluvium along the perennial streams. Most of the report area is drained by the Tongue River and its tributaries. The concentration of dissolved solids in the Tongue River in water year 1968 varied from 674 mg/liter in March, when streamflow was low, to 190 mg/liter in May and June. (Woodard-USGS)
W74-03809

GROUNDWATER DATA IN SANTA BARBARA AND SOUTHERN SAN LUIS OBISPO COUNTIES, CALIFORNIA, SPRING 1970 TO SPRING 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4B.
W74-03814

FLOODS OF THE 1970 AND 1971 WATER YEARS IN MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 2E.
W74-03816

ANNUAL COMPILATION AND ANALYSIS OF HYDROLOGIC DATA FOR ELM FORK TRINITY RIVER, TRINITY RIVER BASIN, TEXAS, 1971,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 2E.
W74-03818

APPLICATION OF STATISTICAL METHODS IN HYDROLOGY (PRIMENENIYE STATISTICHESKIKH METODOV V GIDROLOGII).
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 6B.
W74-03831

DATA OF GLACIOLOGICAL STUDIES. CHRONICLE AND DISCUSSIONS (MATERIALY GLYATSIOLOGICHESKIKH ISSLEDOVANIY. KHRONIKA, OBSUZHDENIYA).
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 2C.
W74-03835

A SYSTEMATIC APPROACH TO THE ANALYSIS OF MEANS. PART II. ANALYSIS OF CONTRASTS. PART III. ANALYSIS OF NON-NORMAL DATA,
General Electric Co., Cleveland, Ohio.
E. G. Schilling.
Journal of Quality Technology, Vol 5, No 4, p 147-159, October 1973. 6 fig, 7 tab, 19 ref.

Descriptors: *Statistical methods, *Quality control, Mathematical models, Reliability, Average.
Identifiers: *Analysis of contrasts, *Analysis of means, Contrasts, Standard deviation, Yates method, Ott's method, Experimental design, Binomial distribution, Lewis-Ott method.

The derivation of analysis of means from the experiment model discussed in Part I (A Systematic Approach to the Analysis of Means) (See W74-00626) provides a systematic procedure for application of Ott's method to a variety of experiment designs. Analysis of contrasts makes available an extension of the Ott technique for 2 to the p power experiments to other forms of contrasts. For 2 to the p power experiments they are equivalent. The use of Scheffe's S-Method for setting limits on the contrasts introduces the ability to assess contrasts

selected either before or after the experiment was run. This it can be used to supplement analysis of means. While each procedure may be used independently, a rational analysis might consist of the following three elements: (1) ANOVA-to initially detect significance, (2) ANOME-to describe the fluctuations in the data leading to significance and graphically reveal the results of the experiment, (3) ANCON-to test and graphically present differences apparent after running ANOME. Many examples exist of practical and profitable application of the Lewis-Ott procedure to a variety of problem areas. Extension of analysis of means to non-normal distribution and to attributes data where the normal approximation to the binomial distribution does not apply should increase the potential for application of the method still further. (Mortland-Battelle)
W74-03837

A SURVEY OF PREDICTION INTERVALS AND THEIR APPLICATIONS,
General Electric Corporate Research and Development, Schenectady, N.Y.
G. J. Hahn, and W. Nelson.
Journal of Quality Technology, Vol 5, No 4, p 178-188, October 1973. 58 ref.

Descriptors: *Statistical methods, *Forecasting, Probability, Regression analysis, Mathematical models.
Identifiers: *Prediction intervals, Binomial distribution, Exponential distribution, Poisson distribution, Weibull distribution, Bayesian prediction, Lognormal distribution, Gamma distribution, Multivariate normal distribution.

Prediction intervals to contain the results of a single future sample with a specified probability gamma are discussed. Also given are simultaneous prediction intervals to contain with probability gamma the results of each of k future samples. Precise definitions of these two types of intervals are given and a variety of prediction intervals for a future sample from a normal population are described. Prediction intervals are provided for samples from a binomial population, and distribution-free prediction intervals are discussed. References concerning prediction intervals for various other situations are given. The discussion is limited to describing and illustrating the methods for constructing prediction intervals. It is assumed throughout that both the past and the future samples are obtained with simple random sampling from the same population. The validity of prediction intervals depends strongly on this key assumption. (Mortland-Battelle)
W74-03858

GUIDE TO SELECTING PROGRAMMABLE DC POWER SUPPLIES,
A. Krigman.
Instruments and Control Systems, Vol 46, No 10, p 46-53, October 1973. 1 fig, 1 tab.

Descriptors: *Electrical equipment, Electronic equipment.
Identifiers: *Programmable power supplies, *Power supplies.

Operation, performance, and available features of programmable dc power supplies are discussed. Manufacturers and specific equipment capabilities are listed. (Little-Battelle)
W74-03863

A GENERAL PROCEDURE FOR CONSUMPTION-DENSITY STUDIES,
California Univ., Santa Barbara. Dept. of Economics.
For primary bibliographic entry see Field 6D.
W74-04040

FIELD WATER-QUALITY INFORMATION ALONG THE PROPOSED TRANS-ALASKA PIPELINE CORRIDOR, SEPTEMBER 1970 THROUGH SEPTEMBER 1972,
Geological Survey, Anchorage, Alaska.
For primary bibliographic entry see Field 5A.
W74-04054

LOGNORMAL SIZE DISTRIBUTION OF PARTICULATE MATTER,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W74-04058

DIGITAL COMPUTER PROGRAMS FOR THE COST ENGINEER.
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W74-04087

ENCYCLOPEDIC DICTIONARY OF EXPLORATION GEOPHYSICS,
Chevron Oil Co., Houston, Tex. Geophysical Div.
For primary bibliographic entry see Field 8B.
W74-04142

DOSE ESTIMATIONS FOR THE HYPOTHETICAL USE OF NUCLEARLY STIMULATED NATURAL GAS IN THE CHEROKEE STEAM ELECTRIC STATION, DENVER, COLORADO,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-04177

CHANGES IN STATISTICAL PROCESSING OF GROUNDWATER LEVEL MEASUREMENTS (WANDLUNGEN BEI DER STATISTISCHEN AUFBEREITUNG VON GRUNDWASSERSTANDSMESSWERTEN),
For primary bibliographic entry see Field 2F.
W74-04247

STATISTICAL CHARACTERISTICS OF THUNDERSTORMS IN YAKUTSK ASSR (STATISTICHESKIYE KHARAKTERISTIKI GROZ YAKUTII),
Institute of Geography of Siberia and the Far East, Irkutsk (USSR).
For primary bibliographic entry see Field 2B.
W74-04253

BASE OF FRESH GROUND WATER (APPROXIMATELY 3,000 MICROMHOS) IN THE SAN JOAQUIN VALLEY, CALIFORNIA),
Geological Survey, Washington, D.C.
R. W. Page.
For sale by USGS, Washington, D C 20242 Price $0.75. Hydrologic Investigations Atlas HA-489, 1973. 1 sheet, 1 map, 25 ref.

Descriptors: *Water quality, *Groundwater, *Mapping, *Geological surveys, *California, Freshwater, Aquifer characteristics, Salinity, Oil fields, Water wells, Water types, Calcium chloride, Sodium chloride, Measurement, Specific conductivity, Dissolved solids, Hydrologic data, Irrigation.
Identifiers: *San Joaquin Valley(Calif).

This one-sheet atlas describes the quality of groundwater in San Joaquin Valley, California. The study area, the southern eight-ninths of the San Joaquin Valley, includes about 10,000 square miles of the valley floor. The warm climate, rich soil, and extensive irrigation make the San Joaquin Valley the largest single agricultural area in the State and one of the most productive agricultural areas in the country. For the purpose of this study, freshwater is defined as that water having a maximum specific conductance of 3,000 micromhos per centimeter, about 2,000 milligrams per liter dissolved solids. The body of fresh groundwater in the San Joaquin Valley is contained in principally unconsolidated continental deposits of Pliocene to Holocene age that extend to depth ranging from less 100 to more than 3,500 feet. (Woodard-USGS)
W74-04274

WATER RESOURCES OF WISCONSIN, ST. CROIX RIVER BASIN,
Geological Survey, Washington, D.C.
H. L. Young, and S. M. Hindall.
For sale by USGS, Washington, D. C. 20242, Price $1.75 per set. Hydrologic Investigations Atlas HA-451, 1973. 4 sheets, 49 ref.

Descriptors: Water resources, *Hydrologic data, *Water yield, *Water quality, *Wisconsin, River basins, Hydrology, Surface waters, Groundwater movement, Precipitation(Atmospheric), Streamflow, Runoff, Flow rates, Water wells, Hydrogeology, Aquifer characteristics, Water analysis, Chemical analysis, Water pollution sources, Water utilization, Water balance, *Maps.
Identifiers: *St. Croix River basin(Wis).

This 4-sheet atlas describes the physical environment, availability, distribution, movement, quality, and use of water in the St. Croix River basin, Wisconsin, as an aid in future planning of water management. The region comprises an area of 4,828 square miles in northwestern Wisconsin. It includes the part of the St. Croix River basin in Wisconsin, and 488 square miles of direct drainage to the Mississippi River between the St. Croix and Chippewa River basins; it comprises 8.6% of the State and consists of parts of 10 counties. Average annual precipitation on the basin was 29.3 inches during 1931-60; periods of drought are infrequent. February is normally the driest month (less than 0.8 inch), and June is the wettest month (about 4.8 inches). Snowfall comprises about 15% of the annual precipitation. An average of about 3,200 cfs, or 9 inches of water per year, runs off the basin. The long-term net change in ground- and surface-water storage in the basin is negligible. Dissolved solids, alkalinity, and hardness of surface waters vary inversely with discharge because they have a relatively constant input from groundwater discharge and are diluted by overland runoff. Sediment yields in the St. Croix River basin are among the lowest in Wisconsin. (Woodard-USGS)
W74-04275

8. ENGINEERING WORKS

8A. Structures

TEMPORARY NAVIGATION LOCK (MODIFICATION OF LOCK AND DAM 53) (FINAL ENVIRONMENTAL IMPACT STATEMENT), OHIO RIVER, ILLINOIS AND KENTUCKY.
Army Engineer District, Nashville, Tenn.
Available from National Technical Information Service as EIS-IL-73-0562-F. $3.75 in paper copy, microfiche $1.45. January 1973. 21 p, 2 tab.

Descriptors: *Dams, *Locks, *Ohio River, *Construction, Illinois, Kentucky, Dusts, Environmental effects, Rivers, Waterfowl.
Identifiers: *Environmental impact statement, *Pulaski County, Ill., *Ballard County, Ken., Noise, Turbidity, Army Corps of Engineers.

The proposed action is associated with the modification of lock and dam 53 on the Ohio River in Pulaski County, Illinois, and Ballard County, Kentucky. The proposed action consists of construction of a temporary lock and dam for the purpose

of alleviating traffic congestion on the lower Ohio River until a more permanent solution can be implemented. The environmental impact of the construction would be to alleviate serious traffic problems by providing efficient and safe passage for river traffic. There would be temporary downstream turbidity during the construction. It may become necessary to coordinate construction activities with the winter waterfowl hunting on the adjacent Kentucky State Wildlife Management Area, depending upon the left bank access during construction. Also, the local economy would be enhanced temporarily during the construction period. Temporary turbidity, noise, and dust associated with the construction activities are the adverse environmental effects anticipated during the project implementation. The only alternatives are for no project or use of non-structural measures. (Daniels-Florida)
W74-03966

OAKLAND INNER HARBOR, ALAMEDA COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.
Avail. from Nat. Tech. Info. Serv., as EIS-CA-73-0761-F. $5.25 in paper copy, $1.45 in microfiche. February, 1973. 67 p, 7 map, 3 tab, 1 ref.

Descriptors: *Environmental effects, *Dredging, *Channels, *Channel improvement, *California, Harbors, Biological communities, Sediment control, Chemicals, Disposal, Environmental control, Plankton, Sessile algae, Burrows, Turbidity, Aquatic environment, Absorption, Planning, Project planning, Feasibility studies.
Identifiers: *Environmental impact statements, *Alameda County(Cal).

A final environmental impact statement has been submitted on the Oakland Inner Harbor of Alameda County, California. The project calls for navigation improvement by deepening the existing channel of the inner harbor. The dredged materials are to be disposed partly at a selected disposal site and partly at sea. Disturbance of bottom sediment during the dredging is foreseen as well as increased turbidity at the dredging and disposal sites. There will be a temporary reduction in the productivity of the biotic community. Release of sediment and absorbed chemicals into the water and removal of deeper substrate material which houses burrowing organisms will have adverse environmental effects on the harbor. Furthermore, the transitory increase in turbidity during dredging and disposal with possible smothering of plankton and sessil benthic organisms will adversely affect the environment. Alternatives include no action, land disposal, ocean disposal of all material or disposal of all materials at Alcatraz. (Daniels-Florida)
W74-04027

8B. Hydraulics

ILLINOIS STORM SEWER SYSTEM SIMULATION MODEL: USER'S MANUAL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-03763

FLOW OVER ALLUVIAL BED,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 2E.
W74-03786

REGIME PROBLEMS OF RIVERS FORMED IN SEDIMENT,
Alberta Univ., Edmonton.
For primary bibliographic entry see Field 2J.
W74-03789

DEWATERING OF THE CLAYTON FORMATION DURING CONSTRUCTION OF THE WALTER F. GEORGE LOCK AND DAM, FORT GAINES, CLAY COUNTY, GEORGIA,
Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 4B.
W74-03819

CONTRIBUTIONS TO THE THEORY OF SURFACE WAVES ON A VISCOUS FLUID,
Wisconsin Univ., Madison. Dept. of Mathematics.
For primary bibliographic entry see Field 2E.
W74-03901

ENVIRONMENTAL DETERMINATION USING HYDRAULIC EQUIVALENCE STUDIES,
Susquehanna Univ., Selinsgrove, Pa. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2J.
W74-04060

PHYSICAL EFFECTS OF MAINTAINING DRAINAGE CHANNELS IN NORTH CAROLINA'S COASTAL AREA,
Soil Conservation Service, Raleigh, N.C.
For primary bibliographic entry see Field 2E.
W74-04075

FILTRATION BEHAVIOR OF CIRCULATING DRILLING FLUIDS,
Koninklijke-Shell Exploratie en Produktie Laboratorium, Rijswijk (Netherlands).
C. Bezemer, and I. Havenaar.
Society of Petroleum Engineers Journal, Vol 6, No 4, p 292-298, December, 1966. 5 fig, 6 tab, 7 ref.

Descriptors: *Drilling fluids, *Filtration, Laboratory equipment, *Mud, Rotary drilling, Laboratory tests, Slurries, Darcy's law, Physical properties.
Identifiers: Dynamic filtration, *Filter cake thickness, Filter press, Filter apparatus.

Studies of dynamic filtration of muds were made in two instruments: (1) a porous pipe through which the mud was circulated; and (2) a dynamic filter apparatus in which mud flow was due to a rotating cylinder. Both devices are described. They were found to give identical relations between equilibrium filtration data and rate of shear at the cake surface. The dynamic filter apparatus is suitable for routine measurements on small amounts of mud. In general, the equilibrium filtration rate was found to be directly proportional to the rate of shear at the cake surface, and the cake thickness inversely proportional. In the temperature range of 75-140F and pressures of 50-200 psi, it was noted that (1) equilibrium filtration rate was but little affected; (2) equilibrium cake thickness increased with temperature (if permeability of cake remains unchanged, cake thickness is inversely proportional to viscosity of the mud filtrate), and (3) equilibrium cake thickness is hardly affected by filtration pressure because cake permeability is almost inversely proportional to filtration pressure. (Gray-NWWA)
W74-04141

ENCYCLOPEDIC DICTIONARY OF EXPLORATION GEOPHYSICS,
Chevron Oil Co., Houston, Tex. Geophysical Div.
R. E. Sheriff.
Society of Exploration Geophysicists, Tulsa, Oklahoma. 1973. 266 p.

Descriptors: *Geophysics, Borehole geophysics, Exploration, Seismology, Gravimetry, Logging.
Identifiers: Fourier transforms, Sea-state scale, *Geodesy, *Dictionaries.

This dictionary was compiled for practical geophysicists rather than for researchers or other specialists. Common geologic terms are included, and popular information like sea-states and earthquake intensity scales are also provided. Terms are expressed in both English and metric unit systems. Tables are provided for the following: Beaufort wind scale and Douglas sea-state scale, fault types, filtering, Fourier transforms, major geodetic systems, magnetic quantities and units, number systems, positioning and navigation systems, stacking, and types of well-log measurements and applications. Entries usually provide a definition, a cross-reference where necessary, trade names, preferred usage terms, references, and figures where appropriate. (Staplin-NWWA)
W74-04142

THE 'TENACIOUS' IRON BACTERIA,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 5B.
W74-04143

A GENERAL PRESSURE BUILDUP THEORY FOR A WELL IN A CLOSED DRAINAGE AREA,
Stanford Univ., Calif.
H. J. Ramey, Jr., and W. M. Cobb.
Journal of Petroleum Technology, Vol 23, No 12, p 1493-1505, December, 1971. 7 fig, 1 tab, 20 ref.

Descriptors: *Pressure, *Flow, *Graphical methods, *Mathematical studies, Diffusivity, Theis equation, *Wells, Groundwater reservoirs, Drawdown, Permeability, *Drainage.
Identifiers: Buildup, Skin effect, Horner, Muskat, Miller-Dyes-Hutchinson, van Everdingen-Hurst, Wellbore storage, Afterflow.

At least 200 papers on buildup theory have been published in the last 30 years but no completely general theory of pressure buildup for closed drainage shapes has appeared. A general theory is developed for pressure buildup for a well in any location within an ideal closed reservoir of any shape. The usual assumptions of constant reservoir thickness, porosity and permeability were made, along with constant compressibility of the liquid and small pressure gradients. Three principal methods of buildup analysis were reviewed, namely, those of (1) Muskat, (2) Miller-Dyes-Hutchinson, and (3) Horner (Theis or van Everdingen-Hurst). All three methods can be applied to any set of pressure buildup data over proper ranges of buildup time. Horner-type plotting appears most generally applicable to the initial transient data for short buildup time. Miller-Dyes-Hutchinson can be used when the producing time is not known, or can be estimated only roughly. Muskat plotting is appropriate for a portion of the buildup data taken in the transition region between the initial transient period and fully static pressure. Some observations were made on drawdown analysis in comparison with buildup analysis. (Gray-NWWA)
W74-04144

DETERMINING FORMATION WATER RESISTIVITY FROM CHEMICAL ANALYSIS.
Sinclair Oil and Gas Co., Tulsa, Okla.
For primary bibliographic entry see Field 2K.
W74-04145

A METHOD FOR DETERMINING THE STATIC PRESSURE OF A WELL FROM BUILDUP DATA,
Mobil Research and Development Corp., Dallas, Tex.
For primary bibliographic entry see Field 8G.
W74-04162

APPLICATION OF ENGINEERING TO WELL CONSTRUCTION AND DEVELOPMENT AT VERNON,
Civil Engineering Association, Vernon, Calif.

J. W. Williams.
Journal American Water Works Association, Vol 56, No 7, p 899-906, July, 1964. 1 tab, 7 ref.

Descriptors: *Groundwater, *Wells, Casings, Drilling, Drilling fluids, *Specific capacity, Well screens, Gravels, *California.
Identifiers: Vernon(Calif), *Sand production, *Gravel packs.

Engineering techniques aided in the completion of a well with a greater specific capacity and far less sand production than any previous city well. Attention was given to drilling technique, drilling mud, surface casing, production casing, gravel packing, and development. Tested sand production averaged less than 10 ppm at 10 minutes after startup and less than 0.01 ppm during continuous operation. These characteristics resulted in substantially reduced costs and longer life expectancy of both well and pump, and low sand production could permit automatic operation. Increased specific capacity reduced lift by about 65 ft. and thus has reduced equipment requirements. (Staplin-NWWA)
W74-04167

AN INVESTIGATION OF BOTTOM CHANGES IN MONTEREY HARBOR (1932-1969),
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2L.
W74-04211

BUDGET OF LITTORAL SANDS IN THE VICINITY OF POINT ARGUELLO, CALIFORNIA,
Army Coastal Engineering Research Center, Washington, D.C.
For primary bibliographic entry see Field 2J.
W74-04221

LAMINAR AND AXISYMMETRIC VERTICAL JETS IN A STABLY STRATIFIED ENVIRONMENT,
Esso Research and Engineering Co., Florham Park, N.J.
A. R. Tenner, and B. Gebhart.
International Journal of Heat and Mass Transfer, Vol 14, No 12, p 2051-2062, 1971. 7 fig, 10 ref, 2 append.

Descriptors: *Jets, *Buoyancy, *Stratification, *Shear, Fluid mechanics, Hydraulics, Flow, Density, Turbulence, Model studies, Mathematical models, Laboratory tests, Viscosity, Laminar flow, Reynolds number.
Identifiers: *Laminar jets.

Experiments have shown that an axisymmetric, laminar, bouyant jet in a stably stratified environment induces the flow of a toroidal cell around itself. The inner portion of the cell is driven upward by the viscous shearing of the jet, and the outer portion descends due to a negative buoyancy force. Under certain limiting conditions this cell draws along a thin layer of the lower density jet and surrounds itself with it in the form of a shroud. The shroud flows in a direction opposite to the jet. Conditions favorable to shroud production require that the environment be stably stratified and that the molecular diffusivities of the fluids involved be extremely small. Turbulent jets are not expected to produce an appreciable shroud. (Jerome-Vanderbilt)
W74-04224

AN IMPROVED MIXING LENGTH THEORY OF TURBULENT HEAT AND MASS TRANSFER,
Clarkson Coll. of Technology, Potsdam, N.Y. Dept. of Chemical Engineering.
M. R. Doshi, and W. N. Gill.
International Journal of Heat and Mass Transfer, Vol 14, No 9 p 1355-1362, 1971.

Descriptors: *Heat transfer, *Mass transfer, *Temperature, Fluid mechanics, Hydraulics, Velocity, Flow, Convection, Diffusion, Mathematical models, Equations, Model studies, Turbulence, Laboratory studies, Data collections, Reynolds number, Mixing.
Identifiers: *Turbulent diffusion, Eddy diffusion.

An improved mixing length theory of turbulent heat and mass transfer is developed which applies more relistically when the velocity gradient, or the temperature gradient, or both are small. Attention is concentrated on heat transfer since appropriate data are available for comparison with the theory. Equations for mass transfer can be obtained in exactly the same fashion except when mass transfer rates are high enough for transverse convection to become important. The theory is applied to turbulent flow between parallel plates which are maintained at constant but different temperatures, and the results compare favorably with experimental data. (Jerome-Vanderbilt)
W74-04231

TEMPERATURE PROFILES FOR TURBULENT FLOW OF HIGH PRANDTL NUMBER FLUIDS,
Akron Univ., Ohio. Dept. of Mechanical Engineering.
International Journal of Heat and Mass Transfer, Vol 14, No 9, p 1465-1471, 1971. 3 fig, 18 ref.

Descriptors: *Hydraulics, *Heat transfer, *Mass transfer, *Temperature, *Pipe flow, Fluid mechanics, Flow, Eddies, Surfaces, Laboratory tests, Fluids, Model studies, Viscosity, Mathematics, Reynolds number, Density, Turbulence, Shear stress, Distribution patterns.
Identifiers: *Prandtl numbers, Schmidt number, Sherwood numbers, Nusselt numbers.

Harriott (1962) has developed a surface renewal and penetration model for turbulent mass transfer which accounts for the effect of eddies not moving into direct contact with the surface. It is based on the hypothesis that eddies move within random distances of the surface, remaining for various lengths of time. Calculations based on this model have been shown to be consistent with experimental data for the Nusselt and Sherwood numbers for fluids with large as well as moderate values of the Prandtl and Sherwood numbers. The model is employed in the estimation of temperature or concentration profiles associated with turbulent flow in order to further demonstrate its usefulness. Emphasis is placed on pipe flow with high Prandtl number fluids. (Jerome-Vanderbilt)
W74-04232

THERMAL INTERACTION OF TWO STREAMS IN BOUNDARY-LAYER FLOW SEPARATED BY A PLATE,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
R. Viskanta, and M. Abrams.
International Journal of Heat and Mass Transfer, Vol 14, No 9, p 1311-1321, 1971.

Descriptors: *Momentum equation, *Heat transfer, *Mass transfer, *Thermal properties, *Boundary layers, Fluid mechanics, Hydraulics, Flow, Currents, Turbulence, Laminar flow, Viscosoty, Temperature, Stream flow, Finite element analysis, Model studies, Mathematical models, Reynolds number, Energy equation, Inviscid flow.

The problem of heat exchange between two fluid streams in boundary layer flow separated by a flat plate is considered. A general analysis applicable to cocurrent or countercurrent, laminar or turbulent flow is presented. An exact solution for the temperature distribution and the heat transfer along the plate is obtained for the special case of constant property, cocurrent, inviscid flow. In the less -restrictive case of constant property laminar or turbulent flow, the wall temperature and heat flux are predicted using the method of superposition for which results of a desired degree of accuracy are possible. For the most general case of variable physical properties the finite difference solution of the momentum and energy equations in von Mises form is indicated. Finally, some illustrative results for cocurrent, constant property, laminar flow in the streams are reported. It is shown that heat exchange analyses which neglect the thermal interaction between fluid streams could be in serious error. (Jerome-Vanderbilt)
W74-04236

TRANSIENT HEAT AND MASS TRANSFER IN FULLY DEVELOPED LAMINAR TUBE FLOWS,
Saskatchewan Univ., Saskatoon. Dept. of Mechanical Engineering.
C. M. Tseng, and R. W. Besant.
International Journal of Heat and Mass Transfer, Vol 15, No 2, p 203-215. 1972. 12 fig, 20 ref.

Descriptors: *Fluid mechanics, *Heat transfer, *Mass transfer, *Temperature, *Laminar flow, Hydraulics, Tubes, Flow, Viscosity, Graphical analysis, Analytical techniques, Model studies, Mathematics, Boundary layers, Reynolds number.
Identifiers: Poiseville tube flow, Nusselt number.

The problem of unsteady heat or mass flux in a Poiseville tube flow is analyzed for incompressible flows with constant properties. The step function and impulse function response solutions are presented for the cases of adiabatic and constant temperature walls. The effects of unsteady flows are discussed. The results are valid for heat or mass transfer, but not simultaneous heat and mass transfer unless coupling effects are negligible. Some typical graphical results are presented. Time, axial length and radius are independent parameters. Consequently, the analytical solutions themselves are a more practical form of presentation than a graphical presentation. The solution permits calculation of local temperatures or concentrations. Typical results are presented for down-stream conditions of local temperature and Nusselt number. (Jerome-Vanderbilt)
W74-04237

SELF-SIMILAR SOLUTIONS FOR A THREE-COMPONENT AXISYMMETRICAL FLOW OF A VISCOUS FLUID,
G. I. Nazarov, and A. K. Yanko.
Fluid Mechanics--Soviet Research, Vol 2, No 4, p 74-78, July-August 1973. 3 ref. (Originally published in Gidromekhanika, No 19, p 62-65, 1971).

Descriptors: *Fluid mechanics, *Flow, *Viscous flow, Equations, Continuity equation.

Self-similar systems are investigated for steady axisymmetrical three-component flow of a viscous incompressible fluid to obtain exact solutions for the second problem of dynamics, when one of the external-forces components is treated as the sought quantity. Particular cases of exact solutions of flows of interest from the physical point of view are examined. (Josefson-USGS)
W74-04248

THE STRUCTURAL-CONTINUUM THEORY OF DILUTE SUSPENSIONS OF RIGID ELLIPSOIDAL PARTICLES,
Kiev State Univ. (USSR).
Ye. Yu. Taran, and Yu. I. Shmakov.
Fluid Mechanics--Soviet Research, Vol 2, No 4, p 68-73, July-August 1973. 4 fig, 13 ref. (Originally published in Gidromekhanika, No 19, p 57-62, 1971).

Descriptors: *Fluid mechanics, *Hydrodynamics, *Flow, *Suspension, *Rheology, Non-Newtonian flow, Stress, Shear, Viscosity, Model studies, Equations.
Identifiers: USSR.

The phenomenological and structural approaches are used in the rheology of polymer solutions for constructing equations of state. Rheological equations of state are presented of dilute suspensions of rigid ellipsoidal particles and polymer solutions whose macromolecules are usually treated as rigid ellipsoids of revolution. These equations are obtained on the basis of Ericksen's rheological model of simple anisotropic fluids and the structural theories of intrinsic viscosity due to Jeffery, Peterlin, and Saito. (Josefson-USGS)
W74-04249

INVESTIGATION OF THE VELOCITY STRUCTURE IN THE BOTTOM REGION OF A TURBULENT WAVE FLOW,
V. L. Maksimchuk, and V. S. Nishchuk.
Fluid Mechanics--Soviet Research, Vol 2, No 4, p 12-18, July-August 1973. 4 fig, 2 tab, 7 ref. (Originally published in Gidromekhanika, No 18, 1971).

Descriptors: *Fluid mechanics, *Flow, *Turbulent flow, *Waves(Water), *Velocity, Viscosity, Resistance, Roughness(Hydraulic), Boundary layers, Fluctuations, Equations.
Identifiers: USSR.

In connection with studies of waveborne sediment transport, much emphasis has recently been placed on dynamics of the bottom region of a wave flow and on problems relating to wave transport of water. Knowledge of the structure of the bottom region of a flow can be used in considering the action of a turbulent wave flow on the bottom sediment layer. Kinematic characteristics in the boundary layer of a wave flow near a rough bottom, with dp/dx nearly equal to 0, were studied photographically in a small wave basin, 8 m in length, 16.2 cm wide, and at a water depth of 13.3 cm. A special boundary sublayer, whose thickness is a basic parameter in determining the resistance and velocity distribution in a flow, was revealed. Distribution of the rate of water transfer by a wave flow near the bottom is computed, and kinematic structure of a wave flow near a rough wall with motion of flow toward the shore (positive direction) and motion seaward (negative direction) is diagrammed. (Josefson-USGS)
W74-04250

8C. Hydraulic Machinery

AN APPLICATION STUDY IN WATER DISTRIBUTION CONTROL,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
R. DeMoyer, Jr., H. D. Gilman, and M. Y. Goodman.
Availability from NTIS as PB-227 336 $3.25 in paper copy, $1.45 in microfiche. Technical Information Series Document No 74SD200 January 1974, 42 p, 12 fig, 3 append. OWRR C-4340(No 9085)(1).

Descriptors: *Water distribution(Applied), *Automatic control, *Regression analysis, *Water demand, Networks, Simulation analysis, Computer models, Model studies, Operation costs, *Pennsylvania, Pumping plants, *Control systems.
Identifiers: Regression modeling, Control strategy, Supervisory control(Water), Time-varying simulation, *Philadelphia.

The major objective was to apply a previously developed control algorithm for reducing costs of operation for the Roxborough High Service-West Oak Lane district of Philadelphia containing two pumping stations and one elevated storage tank. Generation of the control algorithm's pump switching lines was accomplished with a system of programs for simulating demand (using Fourier series) and operation of the district (using a regression analysis model) based on past logging data. The control algorithm was manually implemented by operators at the City's Load Control Center for 1 month and resulted in: 1) 3.8% reduction ($1420) in costs due to pumping and reapportionament of water from alternate sources; 2) Fewer pump changes; 3) Smoother tank depth profiles; and 4) Consistent operation of the district. These results were achieved without investments in additional equipment, operating personnel or field surveys. The complete software system for generating the control algorithm and performing simulation studies for a water distribution with elevated storage is programmed in FORTRAN IV for the GE-RESD timesharing computer (GE-635).
W74-03755

AUTOMATIC CONTROL OF LEVEL, PRESSURE, AND FLOW,
Cla-Val Co., Newport Beach, Calif. Commercial Sales Div.
L. Wolfe.
Journal American Water Works Association, Vol 65, No 10, p 654-662, October 1973. 27 fig.

Descriptors: *Automatic control, Pressure, Flow rates, Water levels, Control systems, Mechanical equipment.
Identifiers: *Valves.

Various types of valves for controlling level, pressure, and flow are diagrammed and the best ways for using them are discussed. Mechanical float, hydraulic float, solenoid, altitude, backpressure-control, rate-of-flow, relief, modulating float, pressure-reducing, pressure-sustaining, and check valves are considered. (Little-Battelle)
W74-03861

DISCHARGE SYSTEM FOR THE A.D. EDMONSTON PUMPING PLANT,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 3B.
W74-04038

OPERATION AND MAINTENANCE OF CENTRIFUGAL PUMPS,
Worthington Corp., Salt Lake City, Utah.
E. J. Watts.
Journal American Water Works Association, Vol 54, No 6, p 711-718, June 1962.

Descriptors: *Pumps, *Hydraulic equipment, Gears, *Centrifugal pumps, *Operations and maintenance.
Identifiers: *Bearings, Housings, Antifriction bearings, Gaskets, Shafts, Sleeves.

The most important steps are described in pump operation, lubrication and cleaning, and maintenance. Suction conditions, priming, starting and operation, and stopping pumps are discussed. Regular grease changes and regular lubrication are emphasized, with information presented on the following: grease-lubricated anti-friction bearings, oil-lubricated antifriction bearings, oil changes, constant level oil control, coupling lubrication, and repacking bearings and housings. With respect to pump maintenance, daily observations are suggested to avert trouble. Semiannual and annual inspections and complete overhauls are called for, with attention to casing, gaskets, wearing rings, shaft and shaft sleeves, and bearings. Performance tests are discussed. Procedures for proper storage of pumps are presented, as well as the minimum spare and repair parts that should be in stock at the installation. (Campbell-NWWA)
W74-04146

RADIO SYSTEM MONITORS PUMP STATIONS,
For primary bibliographic entry see Field 8G.
W74-04148

REMOTE CONTROL IS COMING,
Malcolm Pirnie, Inc., White Plains, N.Y.
H. Wasserman, and R. J. Dugandzic.
Water and Wastes Engineering, Vol 10, No 11, p 39-42, November, 1973. 3 fig.

Descriptors: Automation, *Automatic control, *Remote control, Electronic equipment, *Hydraulic equipment, Pumps, Engineering, *Ohio, *Connecticut.
Identifiers: Akron(Ohio), New Haven(Conn), Visual alarm system, Report-back functions.

Increasing emphasis is being placed on the use of remotely operated pumping stations in modern water supply stations. Operation of such stations involves sensors, control systems, and report-back arrangements. Pump operation is thus controlled, without benefit of immediate operator supervision, to provide a desired condition, or to meet the demands on a water supply distribution system. In remote control arrangements, the sensors may be used to detect storage tank level, system pressure, or flow in a main. Transmission of information and control functions is usually be electrical signal to the devices and recorders that control operation and/or display information. There are many variations of this basic arrangement. Detailed descriptions of two automated stations, one at Akron and one at New Haven are presented. (Hunt-NWWA)
W74-04153

BETTER PUMP INSTALLATION,
Bechtel Power Corp., Gaithersburg, Md.
J. C. Goldthorpe.
Journal American Water Works Association, Vol 65, No 8, p 571-574, August, 1973.

Descriptors: *Pumps, *Centrifugal pumps, Equipment, *Hydraulic machinery, Design, Specifications, Casings.
Identifiers: Shafts, Noise, Vibration.

A better specification will result in a better pump installation. The word 'specification' indicates a specific, precise set of instruction, and vague expressions or descriptions are therefore meaningless. Excellent detailed equipment and system application information is available from pump sales engineers and manufacturers. Presented is a broad overview of areas - bearings, casings, shafts, etc. - in which equipment specification and installation inspections are needed, and general standards for both are given. Also presented is a general discussion on applications of various types of pumps. (Hunt-NWWA)
W74-04154

8E. Rock Mechanics and Geology

ORGANIZATION OF FIELD TESTS AND EVALUATION OF TRICONE BIT PERFORMANCE USING STATISTICAL ANALYSIS AND SONIC LOGS,
Societe Nationale des Petroles d'Aquitaine, Pau (France).
For primary bibliographic entry see Field 8G.
W74-04160

8F. Concrete

WELL GROUTING AND WELL PROTECTION,
Layne and Bowler, Inc., Memphis, Tenn.
K. E. Moehrl.
Journal American Water Works Association, Vol 56, No 4, p 423-431, April, 1964. 2 fig, 2 tab, 5 ref.

Descriptors: *Wells, *Grouting, *Cements, Construction materials, Sealants, Casings, Corrosion.
Identifiers: *Portland cement, *Neat-cement slurry, Caving.

The reasons for grouting and sealing wells are to protect the supply against pollution, to increase the life of the well by protecting the casing pipe against exterior corrosion, to seal out water of an unsatisfactory chemical quality, and to stabilize soil or rock formations which are of a caving nature. Materials described include Portland cement, neat-cement slurry, and special cement slurries. The operations discussed are the following: casing of wells, placement of grout, mixing of grout. Factors contributing to failures in well grouting are also reviewed. (Staplin-NWWA)
W74-04164

8G. Materials

DETERMINING FORMATION WATER RESISTIVITY FROM CHEMICAL ANALYSIS.
Sinclair Oil and Gas Co., Tulsa, Okla.
For primary bibliographic entry see Field 2K.
W74-04145

TRANSIENT PRESSURE TESTING OF FRACTURED WATER INJECTION WELLS,
Pan American Petroleum Corp., Tulsa, Okla.
K. K. Clark.
Journal of Petroleum Technology, Vol 20, No 6, p 639-643, June, 1968. 8 fig, 3 tab, 1 ref.

Descriptors: *Injection wells, *Fracture permeability, *Pressure, Flow, *Permeability, Hydraulics, *Flooding, Fractures, Ground water movement, Limestone, Oil reservoirs, *Texas.
Identifiers: *Vertical fractures, Shut-in test, Fractured formations, Fracture extension, Skin effect.

Excessive injection pressures in water injection wells may create deeply penetrating fractures, or may open existing fractures. If these fractures are oriented toward nearby oil-producing wells, water breakthrough may seriously reduce ultimate recovery. A method of calculating fracture lengths from pressure decline tests on the injection well is based on a linear-flow model that simulates conditions during a relatively short shut-in period. Fracture lengths can be calculated directly if permeability of the formation is known. A graphical technique is presented that gives fracture lengths based on permeabilities calculated from normal shut-in tests, where those permeabilities are adjusted for flow geometry. The method was applied to four injection wells in West Texas. These wells were open-hole completions in the Grayburg limestone at 4200 ft. At completion as oil producers, the wells had been stimulated with nitroglycerine. Prior to conversion to water injection, they had been oxidized and had minor fracturing treatment. The calculated fracture lengths appeared to be reasonable in view of the field observations on performance. (Gray-NWWA)
W74-04147

RADIO SYSTEM MONITORS PUMP STATIONS,
R. A. Young.
Pollution Engineering, Vol 3, No 6, p 24-25, November-December, 1971. 3 fig.

Descriptors: Automation, *Automatic control, Electronic Equipment, Instrumentation, Data transmission, *Remote control, Water works, Costs, *California, *Monitoring.
Identifiers: *Radio alarm reporting system, *San Diego County(Calif), Visual readout system, Alarm encoder.

Due to operational requirements caused by facility loading and terrain the San Diego County, California, Sanitary Engineering Division has turned to modern electronics in the form of a radio alarm reporting system to continually monitor eight widely spread pumping stations. A typical pumping station set up includes a power source, both commercial and emergency, radio transmitter and alarm encoder. Each alarm station is set up to provide an immediate alarm as to location of the station, primary power failure, and wet well and dry well problems to the County Operation Center where it is received on a digital readout printer. The alarm systems components and functions are described. It is anticipated that as the population grows and additional pumping stations are added the radio alarm reporting system will continue to reduce the cost of checking the treatment facilities. (Hunt-NWWA)
W74-04148

NEW SINGLE-WELL TEST FOR DETERMINING VERTICAL PERMEABILITY,
Esso Production Research Co., Houston, Tex.
W. A. Burns, Jr.
Journal of Petroleum Technology, Vol 21, No 6, p 743-752, June, 1969. 12 fig, 9 ref.

Descriptors: *Permeability, *Vertical permeability, Flow, Diffusivity, Transmissivity, Porous media, Oil reservoirs, Computer models, Injection, Shales, *Wells.
Identifiers: Skin effect, Pressure drop, Shut-in pressure, *Horizontal permeability.

A single well can be tested to measure in-situ vertical permeability in addition to horizontal permeability. This test determines the vertical diffusivity and horizontal transmissibility. Conventional down-hole equipment is used between two isolated sets of perforations. Some details of the method are described, in addition to a listing of the factors involved in planning the test. The effectiveness of tight zones as barriers to vertical flow can be determined. Vertical tests across layers of different permeabilities will determine directly the harmonic average of the actual vertical permeabilities of each layer. Leaks due to faulty cementing behind casing will cause test values of vertical permeability to appear abnormally high. Skin damage will have the opposite effect. (Gray-NWWA)
W74-04150

CORROSION AND ITS PREVENTION IN WATERS,
National Chemical Lab., Teddington (England).
G. Butler, and H. C. K. Ison.
Reinhold Publishing Corporation, New York, N.Y. 1966. 281 p.

Descriptors: *Corrosion, *Corrosion control, *Cathodic protection, Metallurgy, Paints, Cavitation, *Water treatment, *Inhibition, *Design.
Identifiers: Temperate factors, Flow factors, Metallic coatings, Non-metallic coatings.

A study is made of the principles of metallic corrosion, the phenomena that can occur, and the means of prevention and control of the corrosion problems arising from the contact of metals with water both natural and treated. Particular emphasis is placed on information and experience gained from the behavior and operation of industrial plants and equipment. The principles of corrosion and variations in water composition are described. The corrosion behavior of metals commonly used in the construction of plants and equipment is discussed, and the influence of mechanical and metallurgical factors and the variations in corrosion severity due to temperature and flow are also dealt with. Methods of corrosion prevention -- including water treatment and inhibition, the use of metallic and nonmetallic coatings and the application of cathodic protection are considered. The importance of the design and method of operation of industrial plants is emphasized. Methods of diagnosing corrosion failures are described. (Campbell-NWWA)
W74-04151

BETTER PUMP INSTALLATION,
Bechtel Power Corp., Gaithersburg, Md.
For primary bibliographic entry see Field 8C.
W74-04154

STANDARD METHOD OF EVALUATING DEGREE OF RUSTING ON PAINTED STEEL SURFACES.
American Society for Testing and Materials, Philadelphia, Pa.
ASTM Standard, ASTM D 610-68, 1970. 10 p, 5 fig, 1 tab.

Descriptors: *Corrosion, *Pitting, *Coatings, Materials, Evaluation.
Identifiers: *Rust.

Standard descriptions, and photographic and areal analysis for the classification of the degree or grades of rusting on painted steel surfaces are presented. (Hunt-NWWA)
W74-04156

CATHODIC PROTECTION IN CONGESTED AREAS,
Hinchman Corp., Detroit, Mich.
L. H. West.
Journal American Water Works Association, Vol 56, No 6, p 721-726, June, 1964. 3 fig, 1 tab.

Descriptors: *Cathodic protection, *Anodes, *Rectifiers, *Leakage, Design, Maintenance.
Identifiers: Pipe-to-soil voltage.

If two or more structures, owned by separate parties, are closely spaced or interwoven in a congested area, they may be bonded together and protected cathodically as one unit. It is very important to have plenty of current reaching metal surfaces and to have safe pipe-to-soil voltages at these locations, because of greater-than-average hazards and costs of leakage. Galvanic anodes and small point-type rectifiers are offered as alternative methods to provide adequate protection for underground structures. Design considerations are presented, and systems maintenance is emphasized and reviewed. (Campbell-NWWA)
W74-04159

ORGANIZATION OF FIELD TESTS AND EVALUATION OF TRICONE BIT PERFORMANCE USING STATISTICAL ANALYSIS AND SONIC LOGS,
Societe Nationale des Petroles d'Aquitaine, Pau (France).
J. C. Raynal, S. A. Gstalder, A. M. Sagot, and J. A. Muckleroy.
Journal of Petroleum Technology, Vol 23, No 4, p 506-512, April, 1971. 9 fig, 2 tab, 10 ref.

Descriptors: *Bits, *Statistical methods, *Electrical well logging, *Rock properties, *Frequency curves, *Data processing, Distribution patterns, Marl.
Identifiers: Sonic log, Tricone bit, Standard deviation, F test, Student's test, Variations, Gaussian distribution, Economic index.

Lack of precision in the results of drilling tests with new designs of bits hinders progress in bit design. Drilling results may be expressed as: (1) footage drilled per hour; (2) footage drilled per bit, and (3) cost per bit. The formations drilled are heterogeneous, and there is lack of precision in the measurement of the variables that affect drilling (such as weight on bit, wear when pulled, revolutions per minute, etc.). Consequently, drilling performance variations of as much as 30% for consecutive tricone bits may be attributed to formation variations alone. Efforts should be directed toward better organization of the field tests, more precise measurements and more attention to identification of formation heterogeneity. The sonic log is recommended as one method of defining variations in hardness of the rock. The application of statistical methods is discussed briefly and an example is shown of the use of the technique in

a comparison of two families of bits under similar conditions. (GraynNWWA)
W74-04160

CORROSION AND CORROSION CONTROL,
Massachusetts Inst. of Tech., Cambridge. Corrosion Lab.
H. H. Uhlig.
John Wiley and Sons, New York, N.Y. Second edition 1971. 419 p.

Descriptors: *Corrosion, *Corrosion control, *Pitting, Chemical reactions, Metallurgy, Coatings, Paints, Stainless steel.
Identifiers: *Pourbaix diagrams, *Intergranular corrosion, Stress cracking, Corrosion fatigue.

The electrochemical principles underlying corrosion reactions are discussed as well as the scientific principles upon which control of corrosion is based. Environmental effects on properties of metals and alloys are described. Practical and engineering applications are cited which illustrate how basic corrosion science is usefully employed. The main emphasis is on quantitative principles and engineering calculations rather than on descriptive case histories. Most of the material in this edition has been updated to incorporate the rapid advances made in corrosion science and engineering. The featured revisions and additions include: detailed descriptions of critical pitting potential and stress corrosion cracking; complete chapters on corrosion fatigue and passivity; new material on the intergranular corrosion of nonsensitized stainless steels and related alloys; and an elementary description of Pourbaix diagrams. (Staplin-NWWA)
W74-04161

A METHOD FOR DETERMINING THE STATIC PRESSURE OF A WELL FROM BUILDUP DATA,
Mobil Research and Development Corp., Dallas, Tex.
A. S. Odeh, and R. Al-Hussainy.
Journal of Petroleum Technology, Vol 23, No 5, p 621-624, May, 1971. 4 fig, 1 tab, 6 ref.

Descriptors: *Pressure, Time, *Graphical methods, Drainage area, Oil reservoirs, Gases, *Wells.
Identifiers: *Static pressure, *Boundary effect, Shut-in pressure, Bottom-hole pressure.

A method is described for the determination of the static pressure of a well from the buildup test data. It differs from the commonly used methods in that it does not require the knowledge of the porosity and permeability of the productive zone, the viscosity and compressibility of the produced fluid, and the drainage area of the well. It does, however, require the value of the pressure at time zero. The derivation and analysis of the method are given and the general application is discussed. The method is illustrated by calculations based on buildup data from an oil well and a gas well. (Gray-NWWA)
W74-04162

WELL GROUTING AND WELL PROTECTION,
Layne and Bowler, Inc., Memphis, Tenn.
For primary bibliographic entry see Field 8F.
W74-04164

THE RELATIONSHIP BETWEEN GALVANIC CURRENT AND DISSOLUTION RATES,
Rockwell International Corp., Thousand Oaks, Calif. Science Center.
F. Mansfield.
Corrosion, Vol 29, No 10, p 403-405, October, 1973. 2 fig, 11 ref.

Descriptors: *Corrosion, *Electrochemistry, Chemical reaction, Anodes, Cathodes, Instrumentation.
Identifiers: Dissolution rates, *Galvanic corrosion, Corrosion potential.

The recent development of instrumentation suitable for accurate determination of galvanic currents suggests that more data of this nature will be gathered and reported. It is shown that galvanic current data cannot be an accurate measure of dissolution rates. Correction of galvanic current data is possible, however, and correction procedures are explained for two limiting cases. Experimental support for the relationships derived is presented for Al alloys in aerated 3.5% NaCl coupled to a variety of dissimilar metals and alloys. (Hunt-NWWA)
W74-04168

SYNERGISTIC INHIBITION OF FERRIC ION CORROSION DURING CHEMICAL CLEANING OF METAL SURFACES,
Du Pont de Nemours (E. I.) and Co., Wilmington, Del. Engineering Materials Lab.
M. A. Streicher.
Corrosion, Vol 28, No 4, p 143-148, April, 1972. 4 fig, 2 tab, 12 ref.

Descriptors: Corrosion, *Corrosion control, *Inhibition, *Rusting, Scalings, Chemistry, *Electrochemistry.
Identifiers: Potentiostatic polarization, Surface active agent, Synergistic inhibition.

To minimize attack on metals during cleaning with acid solutions containing dissolved iron in the ferric state, both hydrogen evolution corrosion and ferric ion corrosion must be effectively inhibited. There are many inhibitors which effectively reduce hydrogen evolution corrosion, but these have a relatively small effect on ferric ion corrosion. Data are provided which show the synergistic action of certain substituted thioureas and thioamides with certain alkali metal and amine alkyl or alkylaryl sulfonates and solfonated esters in effectively inhibiting both ferric ion and hydrogen evolution corrosion on ferrous and other metals during exposure to a variety of acids. Potentiostatic measurements indicate that inhibition is a result of retardation of cathodic reactions. (Hunt-NWWA)
W74-04169

8I. Fisheries Engineering

INVESTIGATIONS OF NUTRITION AND METABOLISM OF CATFISH AND UTILIZATION OF FISHERIES PRODUCTS,
Kansas State Univ., Manhattan.
O. W. Tiemeier, and C. W. Deyoe.
Available from NTIS, Springfield, Va 22151 COM-72-11300, Price $3.00 printed copy, $1.45 microfiche. National Marine Fisheries Service Contract Report (NOAA), January 1972. 103 p, 35 fig, 36 tab, 5 ref.

Descriptors: *Fish diets, *Nutrient requirements, *Catfishes, *Fisheries, *Fish management, Surveys, Food habits, Fish food organisms, Proteins, Fish physiology, Growth stages, Mortality, Metabolism.

A series of experiments were conducted using fry, fingerling and age group II channel catfish and fingerling blue catfish. Evaluations were made on growth and survival of fish using feeds containing various percentages of proteins; sinking or floating feeds; different feeding rates; and various feeding methods. Intermediary metabolism; effects of various feeding regimens on certain blood components; and tissue structure of the digestive tract also were studied. Data on the various feeds used in the experiments are tabulated; and a summary of treatments, stocking, survival and conversions is presented. Survival in treatments varied from 95.9% to 100% in all regimens. (Woodard-USGS)
W74-03802

OHIO MUSSEL FISHERIES INVESTIGATION. PART I: MUSSEL STUDIES. PART II: WATER CHEMISTRY AND SEDIMENT ANALYSES. PART III: PLANKTON SURVEY,
Eastern Michigan Univ., Ypsilanti.
For primary bibliographic entry see Field 5C.
W74-03931

OHIO MUSSEL FISHERIES INVESTIGATION. PART I: MUSSEL STUDIES,
Eastern Michigan Univ., Ypsilanti.
J. M. Bates.
Ohio Division of Wildlife, Columbus; and National Marine Fisheries Service, Washington, D.C., completion report November 1970, p 1-108, 111 fig, 26 tab. 4-28-R. 14-17-0004-433.

Descriptors: *Ohio, *Mussels, *Fisheries, History, Systematics, Harvesting, Clams, Reproduction, Parasitism, Distribution, Oligochates, Trematodes, Regulation, Standing crops, Management, Rivers, Plankton, Shellfish.
Identifiers: Muskingum River(Ohio), Ellis Dam(Ohio), Marietta(Ohio), Corbicula fluminea, Sanctuaries, Shells, Pearls, Tullberg layers.

The Muskingum River, Ohio today supports what are probably the finest fresh water mussel stocks in the world. Other streams and rivers in Ohio do not at present support mussel populations of any potential commercial importance. The location and extent of mussel beds, species composition and density, rate of harvest, rate of recruitment, sex, age, and size composition of populations, and other basic biological information were determined. Investigations into the basic phenomena of shell formation, particularly the composition of the extrapallial fluid, were undertaken. The present high market demand for shells has developed largely during the past two decades due directly to demand created by the Japanese cultured pearl industry. Harvesting methods are described. Histological studies indicate normal patterns of gametogenesis in all species. It is completely possible that stocking programs could be instituted to reconstitute commercially valuable populations in certain streams, as the viable nature of the mussel populations of the Muskingum River has been established. The introduced Asiatic clam, Corbicula fluminea, has invaded the lower stretches of the Muskingum River. (See also W74-03931) (Jones-Wisconsin)
W74-03932

OHIO MUSSEL FISHERIES INVESTIGATION. PART II: WATER CHEMISTRY AND SEDIMENT ANALYSES,
Eastern Michigan Univ., Ypsilanti.
For primary bibliographic entry see Field 5C.
W74-03933

OHIO MUSSEL FISHERIES INVESTIGATION. PART III: PLANKTON SURVEY,
Eastern Michigan Univ., Ypsilanti.
For primary bibliographic entry see Field 5C.
W74-03934

AGE STRUCTURE AND GROWTH OF FISH IN WATERS OF NORTHERN TADZHIKISTAN, (IN RUSSIAN),
Akademiya Nauk Tadzhikskoi SSR, Dushanbe. Institut Zoologii i Parazitologii.
V. A. Maksunov.
Vopr Ikhtiol. Vol 12, No 4, p 713-727. 1972.
Identifiers: *Age groups, Benthos, Fish, *Growth, Mysidae, Northern, Productivity, *USSR(Tadzhikistan).

The age and sexual composition of the population, linear growth and weight increases were analyzed for 13 species of fish in the most important commercial fishing grounds of the Tadzhik SSR (USSR) from 1950-1965. Food supply, environmental conditions and commercial use of reserves were considered. The size of the Mysidae population in 1963-1965 caused an increase in benthos productivity and a sharp improvement in feeding conditions.--Copyright 1973, Biological Abstracts, Inc.
W74-04071

INTENSIVE OUTDOOR CULTURE OF MARINE PHYTOPLANKTON ENRICHED WITH TREATED SEWAGE EFFLUENT,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5D.
W74-04103

USE OF PHYTOPHAGOUS FISH TO CONTROL AQUATIC PLANTS,
Instytut Rybactwa Srodladowego, Zabieniec (Poland). Dept. of Fish Culture.
For primary bibliographic entry see Field 3B.
W74-04106

FEEDING AND FOOD RELATIONSHIPS OF THE TROUT SALMO ISCHCHAN KESSLER AND WHITEFISH COREGONUS LAVARETUS LUDOGA POLIAKOW OF LAKE SEVAN, (IN RUSSIAN),
For primary bibliographic entry see Field 2H.
W74-04203

SOME ASPECTS OF THE THEORY OF EXPLOITATION OF FISH RESOURCES, (IN RUSSIAN),
Moscow State Univ. (USSR). Faculty of Biology and Soil Science.
G. V. Nikol'skii.
Vopr Ikhtiol. Vol 12, No 4, p 603-671. 1972.
Identifiers: Fecundity, *Fish management, Resources, Fish population, *Fisheries(Exploitation), *Commercial fishing, Fish farming.

Biological and economical aspects of the exploitation of fish resources are discussed. The decrease in resources caused by commercial exploitation is contrasted to the accomplishments of fish farming which provide means for increasing the productivity of natural areas. Effects of fishing on such factors as fecundity, population structure, use of food, and recruitment are included. Principles for rational control of commercial fishing, including agreements involving international waters are explored.--Copyright 1973, Biological Abstracts, Inc.
W74-04278

WATER SUPPLY IN THE VOLGA BASIN AND ITS EFFECT ON STRUGEON REPRODUCTION, FAMILY ACIPENSERIDAE UNDER CONDITIONS OF NATURAL AND REGULATED FLOW, (IN RUSSIAN),
Tsentralnyi Nauchno-Issledovatelskii Institut Osetrovogo Khozyaistva, Astrakhan (USSR).
P. N. Khoroskho.
Vopr Ikhtiol. Vol 12, No 4, p 665-673. 1972. Illus.
Identifiers: Acipenseridae, Bream, *Flow regulation, Ide, Reproduction, *Spawning grounds, *Sturgeon reproduction, *USSR(Volga River basin).

Regulation of the flow of the Volga (USSR) eliminated most of the spawning grounds and had unfavorable effects on the conditions of reproduction. Reproductive efficiency was directly related to the volume of flow, nature of the flood wave and water temperature. Sharp changes in the flow during the winter affected behavior during maturation of the reproductive bodies. In some cases changes in the bream, ide and silver bream populations led to consumption of sturgeon eggs by these fish. Despite the unstable hydrological regime of the Volga, sturgeon reproduction continued at a rather high rate. About 4 billion eggs were produced yearly in channel spawning grounds of the Lower Volga.--Copyright 1973, Biological Abstracts, Inc.
W74-04279

CLOSED SEASON REGULATION FOR TABLE FISH IN THE SUKHANDAR'YA RIVER BASIN, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Institut Zoologii i Parazitologii.
A. M. Mukhamediev, and K. S. Sattarov.
Uzb Biol Zh. Vol 16, No 4, p 41-42. 1972.
Identifiers: *Fish regulation(Seasonal), River basins, *USSR(Sukhandar'ya River basin).

The March 16 through May 31 period is recommended as closed season for table fish in the Sukhandar'ya river basin (USSR) on the basis of a study of life cycles of this fauna.--Copyright 1973, Biological Abstracts, Inc.
W74-04290

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

MONTEREY BAY BIBLIOGRAPHY.
Moss Landing Marine Labs., Calif.
For primary bibliographic entry see Field 02L.
W74-04218

MONTEREY BAY BIBLIOGRAPHY. SUPPLEMENT NUMBER ONE.
Moss Landing Marine Labs., Calif.
For primary bibliographic entry see Field 02L.
W74-04219

SUBJECT INDEX

ABATEMENT
Iowa Water Pollution Control Commission V. Town of Paton (Authority to Compel Town to Change its Sewage System).
W74-03985 6E

ABSCISSION
Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

ABSORPTION
Absorptiometric Determination of Trace Amounts of Sulphide Ion in Water,
W74-04072 5A

Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

ACCLIMATIZATION
Results of Acclimatization of Corophium sowinskyi (Mart.) in the Veselovsk Reservoir, (In Russian),
W74-04099 2H

ACID MINE WATER
A Comparative Study of Plankton Respiration in an Acid Polluted Lake and Its Acid Free Embayments,
W74-03935 5C

An Analysis of the Zooplankton Community in an Acid Polluted Reservoir,
W74-03938 5C

ACID TREATMENT
The 'Tenacious' Iron Bacteria,
W74-04143 5B

ACIDIC WATER
Primary Productivity in Relation to Chemical Parameters in Cheat Lake, West Virginia,
W74-04089 5C

Management of Radioactive Aqueous Wastes from AEC Fuel-Reprocessing Operations,
W74-04188 5B

ACT OF GOD
Chicago and North Western Railway Company v. Tyler (Damage Action Caused by Flooding Waters).
W74-04012 6E

ACTIVATED CARBON
Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

ACTIVATED SLUDGE
Process Control of Activated Sludge Treatment,
W74-03764 5D

Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

ADENOHYPOPHYSIS
Radiation Reaction of the Adenohypophysis-Gonads System in Cold-Blooded Animals,
W74-04180 5C

ADJACENT LANDOWNERS
Eminent Domain.
W74-04020 6E

ADJUDICATION PROCEDURE
The Ground-Water Depletion Allowance Under the Federal Income Tax,
W74-03962 6E

ADMINISTRATIVE AGENCIES
Canals and Waterways.
W74-03990 6E

ADMINISTRATIVE REGULATIONS
Florida Water Resources Act of 1972.
W74-04019 6A

ADOPTION OF PRACTICES
A General Procedure for Consumption-Density Studies,
W74-04040 6D

AEOLIAN SOILS
Wind Erosion as a Factor in Soil Formation in the Pierre-Shale Landscape of Western South Dakota,
W74-03781 2J

ERGS,
W74-04264 2J

AERATION
U-Tube Aeration,
W74-04046 5D

Aeration at Weirs.
W74-04113 5C

AERATION (ARTIFICIAL)
Effect of Artificial Water Aeration on Basin Algal Flora, (In Russian),
W74-03918 5C

AERATORS (U-TUBE)
U-Tube Aeration,
W74-04046 5D

AERIAL PHOTOGRAPHY
Application of Remote Sensing to River Mechanics,
W74-03800 2E

Aerial Detection of Spill Sources,
W74-04196 5A

Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

AEROBIC CONDITIONS
U-Tube Aeration,
W74-04046 5D

AFRICA
An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

A New Approach to Domestic Water Rating,
W74-03963 6C

Silcretes and Associated Silica Diagenesis in Southern Africa and Australia,
W74-04067 2J

AGE GROUPS
Age Structure and Growth of Fish in Waters of Northern Tadzhikistan, (In Russian),
W74-04071 8I

AGRICULTURAL RUNOFF
Nitrogen and Phosphorus Losses in Surface Runoff from Agricultural Land as Influenced by Placement of Broadcast Fertilizer,
W74-04096 5C

AGRICULTURE
Field Shelterbelt Afforestation and Greenery Planting,
W74-03883 3F

AIR CIRCULATION
Quasi 2-year Variation in Runoff of USSR Rivers (Kvazidvukhletnyaya variatsiya v stoke rek SSSR),
W74-03834 2E

AIR POLLUTION
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

Aerial Radiological Measuring Survey of the Area Surrounding the Monticello Nuclear Generating Plant, Monticello, Minnesota, August 1970.
W74-04185 5B

Aerial Radiological Measuring Survey of the Area Surrounding Big Rock Point Nuclear Plant, Big Rock Point, Michigan, 1968,
W74-04186 5B

AIR POLLUTION EFFECTS
Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

AIR TEMPERATURE
West Side Crop Adaptability Study.
W74-03922 3F

Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2L

AIR-WATER INTERFACES
Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

ALABAMA
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

Water Availability in Mobile County, Alabama,
W74-03811 4B

Dewatering of the Clayton Formation During Construction of the Walter F. George Lock and Dam, Fort Gaines, Clay County, Georgia,
W74-03819 4B

Social Accounting Approaches to Water Resource Use in Economic Development.
W74-03907 6B

The Economic Impact of the Ban on Commercial Fishing on Lake Pickwick,
W74-03910 6B

ALAMEDA COUNTY (CAL)
Oakland Inner Harbor, Alameda County, California (Final Environmental Impact Statement).
W74-04027 8A

ALASKA
Alaska Water Resources Research Needs for the 70's.
W74-03757 6B

Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

Thermal Tolerances of Interior Alaskan Arctic Grayling (Thymallus arcticus),
W74-03759 5C

Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

ALBURNUS-FILIPII
Data on the Biology of Alburnus filippii Kessler Living in the Water Reserves of the Armenian SSR, (in Russian),
W74-03953 2I

ALEWIVES
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

ALFALFA
Alfalfa Quality: Is There a Difference,
W74-03930 3F

Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

ALGAE
Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

The Diatomaceous Populations in the Basin of the Meurthe River: Attempt at an Hydrobiological Synthesis, (In French),
W74-04288 2I

Algae from Some Lakes in Nordmarka Near Oslo,
W74-04289 2H

ALGAE CONTROL
Causes and Control of Algal Blooms in Spiritwood Lake, North Dakota,
W74-03906 5C

ALGAE COUNT (SOILS)
Effect of Environmental Factors on Algae Count in the Main Soil Types of the Estonian SSR (In Estonian),
W74-04114 2G

ALKALI METALS
Determining the Cation Capacity of Humic Substances Using Flame Photometry, (In Estonian),
W74-04298 5A

ALLUVIAL AQUIFERS
Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

Evaluation of Groundwater Resources in Livermore Valley, California,
W74-04201 2F

ALLUVIAL CHANNELS
Flow Over Alluvial Bed,
W74-03786 2E

Regime Problems of Rivers Formed in Sediment,
W74-03789 2J

Port of Portland V. an Island in Columbia River (Action to Quiet Title to Alluvial Island in Columbia River).
W74-03987 6E

Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

ALPINE STREAMS
Experiences with the Correction of Disordered Streams of the Alpine Type, (In Italian),
W74-04276 4D

ALTERATION OF FLOW
Private Rights in Waters.
W74-03973 6E

Czarnick v. Loup River Public Power District (Liability of Power District for Damage Resulting From Negligence).
W74-04021 6E

ALTERNATIVE PLANNING
Alternative Futures Using the Wollman-Bonem Models,
W74-03888 6A

An Industrial Pollution Index,
W74-03889 5G

ALTERNATIVE WATER USE
Sequential Stochastic Optimization for Reservoir System,
W74-03914 4A

AMMONIA
Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

AMMONIUM
Nitrate Determination by a Modified Conway Microdiffusion Method,
W74-03845 2G

AMPHIBIANS
Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

ANAEROBIC BACTERIA
Temperature-Gradient Incubator for the Growth of Clostridia,
W74-03878 5A

ANALYSIS
Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

ANALYSIS OF CONTRASTS
A Systematic Approach to the Analysis of Means. Part II. Analysis of Contrasts. Part III. Analysis of Non-Normal Data,
W74-03837 7C

ANALYSIS OF MEANS
A Systematic Approach to the Analysis of Means. Part II. Analysis of Contrasts. Part III. Analysis of Non-Normal Data,
W74-03837 7C

ANALYTICAL TECHNIQUES
Gelatin Coated Microscope Slides in Sedimentary Size Analysis,
W74-04055 2J

Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level,
W74-04104 5A

Environmental Applications of Advanced Instrumental Analyses: Assistance Projects, FY 72,
W74-04197 5A

ANIMAL BEHAVIOR
Effects of Temperature Change on Irrigation Rate in Arenicola marina (L.),
W74-04225 5C

ANIMAL METABOLISM
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

ANIMAL PATHOLOGY
Effects of Temperature Change on Irrigation Rate in Arenicola marina (L.),
W74-04225 5C

Seasonal Variation in Heart Rate Response to Core Temperature Changes,
W74-04244 5C

ANIMAL PHYSIOLOGY
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

ANION CORRECTION FACTOR
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

ANNUAL
A Map of Annual River Runoff in the Pamirs and Pamir-Alay Mountains (Karta godovogo stoka rek Pamira i Pamiro-Alaya),
W74-03836 2E

ANODES
Cathodic Protection in Congested Areas,
W74-04159 8G

ANTICHOLINESTERASES
Test for Anticholinesterase Materials in Water,
W74-03838 5A

ANTIMONY
Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

ANURANS
Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

APPROXIMATION METHOD
Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

AQUATIC ANIMALS
A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

AQUATIC HABITATS
Montezuma Well, Arizona, as a Habitat,
W74-03925 2H

Estuaries Under Attack,
W74-04033 6G

AQUATIC INSECTS
Effect of Low Oxygen Concentration on Survival and Emergence of Aquatic Insects,
W74-04100 5C

AQUATIC LIFE
Leasing of Areas for Cultivation of Marine Resources.
W74-03993 6E

Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

AQUATIC MICROORGANISMS
Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

AQUATIC WEED CONTROL
Use of Phytophagous Fish to Control Aquatic Plants,
W74-04106 3B

AQUEDUCTS
Village of Cornwall v. Environmental Protection Administration of the City of New York (Approval Sought for Interconnection with Aqueduct).
W74-03995 5G

AQUEOUS SOLUTIONS
Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXII. Symmetrical Periodic Current Differential Electrolytic Potentiometry in Oxidation - Reduction Titrimetry,
W74-03860 5A

Colorimetric Determination of Boron in Aqueous Solutions and in Borosilicate Glass by Solvent Extraction,
W74-03862 5A

Direct Determination of Sulfide by Rapid Direct Current Polarography,
W74-03865 2K

AQUICULTURE
Intensive Outdoor Culture of Marine Phytoplankton Enriched with Treated Sewage Effluent,
W74-04103 5D

AQUIFER CHARACTERISTICS
Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

AQUIFER FEEDER CANAL
Effects of the Feeder Canal on the Water Resources of the Fort Lauderdale Prospect Well-Field Area,
W74-04259 5G

AQUIFER MANAGEMENT
Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

AQUIFERS
Looking for Pollution Under the Earth,
W74-04004 5B

ARCTIC GRAYLING
Thermal Tolerances of Interior Alaskan Arctic Grayling (Thymallus arcticus),
W74-03759 5C

AREAL DISTRIBUTION
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

ARENICOLA MARINA (L
Effects of Temperature Change on Irrigation Rate in Arenicola marina (L.),
W74-04225 5C

ARID CLIMATES
Fire Climates in the Southwest,
W74-04130 4A

ARID LANDS
The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

ARIZONA
Montezuma Well, Arizona, as a Habitat,
W74-03925 2H

Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part II. Structure of the Industry.
W74-04082 5G

Fire Climates in the Southwest,
W74-04130 4A

ARKANSAS
Petrus V. Arkansas Irrigation Co. (Injunction to Prevent Interference with Flowage Rights).
W74-03994 6E

ARKANSAS RIVER (COLO)
Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

AROMATIC COMPOUNDS
Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

Utilization of Aromatic Compounds by Benthic Microorganisms of a Eutrophic Lake,
W74-04295 5C

ARSENIC
Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

ARTIFICIAL ISLANDS
Jurisdictional Problems Created by Artificial Islands.
W74-04022 6E

ARTIFICIAL RECHARGE
The Hydraulics of Artificial Recharge,
W74-03820 4B

Borehole Recharge: The Compatability of Recharge Water With the Aquifer,
W74-03822 4B

Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

Clogging in Recharge Wells, Causes and Cures,
W74-03824 4B

Groundwater Recharge for Waste Water Reclamation and/or Storage of Supplies: A Cost Comparison with Conventional Methods,
W74-03825 5D

The Future Prospects of Artificial Groundwater Recharge,
W74-03826 5D

ASCOPHYLLUM NODOSUM
Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

ASH
Determination of Cation Capacity of Humic Acids by Thin Ash Content, (In Estonian),
W74-04299 5A

ASSAY
Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

Environmental Radioactivity - Ispra 1971,
W74-04176 5B

Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

ASYMPTOTIC THEORY
Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

ATLANTA (GEO)

ATLANTA (GEO)
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

ATLANTIC SALMON
Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

Natural Radiation Loads on the Eggs of Marine and Fresh Water Organisms,
W74-04182 5C

ATMOMETERS
The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

ATMOSPHERE
Quasi 2-year Variation in Runoff of USSR Rivers (Kvazidvukhletnyaya variatsiya v stoke rek SSSR),
W74-03834 2E

ATOMIC ABSORPTION SPECTROSCOPY
Application of the Carbon Cup Atomisation Technique in Water Analysis by Atomic-Absorption Spectroscopy,
W74-04073 5A

AUSTRALIA
Water Resources Newsletter, June 1973.
W74-03774 4A

Silcretes and Associated Silica Diagenesis in Southern Africa and Australia,
W74-04067 2J

Supratidal Environment and Geochemistry of Some Recent Dolomite Concretions, Broad Sound, Queensland, Australia,
W74-04069 2L

A Meromictic Lake in Australia,
W74-04101 5C

Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

AUTOMATIC CONTROL
An Application Study in Water Distribution Control,
W74-03755 8C

Automatic Control of Level, Pressure, and Flow,
W74-03861 8C

Radio System Monitors Pump Stations,
W74-04148 8G

Remote Control is Coming,
W74-04153 8C

AVERAGE RUNOFF
A Map of Annual River Runoff in the Pamirs and Pamir-Alay Mountains (Karta godovogo stoka rek Pamira i Pamiro-Alaya),
W74-03836 2E

BACTERIA
Temperature-Gradient Incubator for the Growth of Clostridia,
W74-03878 5A

Protection of Saprophytes as the Main Factor in a Program for Protection of Water Environments, (In Polish),
W74-04297 5G

BALLARD COUNTY
Temporary Navigation Lock (Modification of Lock and Dam 53) (Final Environmental Impact Statement), Ohio River, Illinois and Kentucky.
W74-03966 8A

BARBADOS (W
Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

BARRIER ISLANDS
Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

BASELINE STUDIES
Chemical and Biological Survey of the Savannah River Adjacent to Elba Island,
W74-03804 5B

An Ecological Evaluation of a Thermal Discharge. Part II: The Distribution of Phytoplankton and Primary Productivity Near the Western Shore of Lake Erie,
W74-03936 5C

Cleaning up a River,
W74-03968 5G

The Future of Water Quality Control,
W74-04026 5G

Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

An Ecological Evaluation of a Thermal Discharge. Part III: The Distribution of Zooplankton Along the Western Shore of Lake Erie,
W74-04095 5C

BAYS
Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

Some Physical and Chemical Properties of the Gulf of Corinth,
W74-04273 2L

BEACH EROSION
Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

BEACHES
Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2L

An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

Time Dependent Shear Stress Beneath a Shoaling Wave,
W74-04213 2J

Theoretical Study of Longshore Currents on a Plane Beach,
W74-04214 2E

On the Breaking of Waves Arriving at an Angle to the Shore,
W74-04217 2H

BEARINGS
Operation and Maintenance of Centrifugal Pumps,
W74-04146 8C

BED LOAD
The Rhein Study,
W74-03788 2J

Dispersion of Contaminants Attached to Sediment Bed Load,
W74-03797 5B

Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

Flume Experiments on the Transition from Ripples to Lower Flat Bed with Increasing Sand Size,
W74-04063 2J

BEHAVIOR
A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

BELGIUM
Some Models for the Economic Evaluation of the Environment,
W74-04083 5G

BENEFITS
The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

BENTHIC ALGAE
Organic Matter of the Soil in the Kiev Reservoir and its Role in the Development of Benthic Algae, (In Russian),
W74-04281 5C

BENTHIC FAUNA
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

BENTHIC FLORA
North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

BENTHOS
A Comparison of Invertebrate Drift in Three Michigan Streams,
W74-03902 5B

The Mollusk Fauna of the Bolshoi Karabulak Oxbow Lake (Volga Delta), (In Russian),
W74-04165 2H

BIBLIOGRAPHIES
Monterey Bay Bibliography.
W74-04218 2L

Monterey Bay Bibliography. Supplement Number One.
W74-04219 2L

BILE PIGMENT
Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

BIOACCUMULATION
Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

BIOASSAY
Thermal Tolerances of Interior Alaskan Arctic Grayling (Thymallus arcticus),
W74-03759 5C

Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

Microbiological Determination of Thiram,
W74-03846 5A

In-Plant Biological Monitoring,
W74-03855 5A

Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

Chronic Toxicity of a Copper, Cadmium and Zinc Mixture to the Fathead Minnow (Pimephales promelas Rafinesque),
W74-03873 5C

Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

Seasonal Variation in Heart Rate Response to Core Temperature Changes,
W74-04244 5C

BIOCHEMICAL OXYGEN DEMAND
Brave New World of TOC and TOD.
W74-03856 5A

BIOCHEMISTRY
Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

BIOINDICATORS
In-Plant Biological Monitoring,
W74-03855 5A

Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

BIOLOGICAL COMMUNITIES
An Analysis of the Zooplankton Community in an Acid Polluted Reservoir,
W74-03938 5C

BIOLOGICAL SAMPLES
Improvements in the Wet Oxidation-Dithizone Method for Determining Low Mercury Levels in Food,
W74-03869 5A

BIOMASS
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

Benthic Macroinvertebrate Diversity in Three Differentially Perturbed Michigan Streams,
W74-03905 5C

BIOOXIDATION
Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

Mixed Culture Biooxidation of Phenol. II. Steady State Experiments in Continuous Culture,
W74-03880 5C

Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

BIOTRANSFORMATION
Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

BIPHENYL
Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

BISCAYNE BAY (FLA)
Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

BITS
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

BLACK SQUIRREL CREEK BASIN (COLO)
Water-Level Declines and Ground-Water Quality, Upper Black Squirrel Creek Basin, Colorado,
W74-03808 4B

BLOOD PRESSURE
Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

BOGS
The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

BOILING WATER REACTOR
Comparison of Measured and Calculated Radiation Exposure from a Boiling Water Reactor Plume,
W74-04175 5B

BORON
Colorimetric Determination of Boron in Aqueous Solutions and in Borosilicate Glass by Solvent Extraction,
W74-03862 5A

BOTTOM SAMPLING
A Comparison of Invertebrate Drift in Three Michigan Streams,
W74-03902 5B

BOTTOM SEDIMENTS
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

Basic Types of Recent Bottom Sediments of the Mediterranean Sea, Their Mineralogy and Geochemistry (Osnovnyye tipy sovremennykh donnykh osadkov Sredizemnogo morya, ikh mineralogiya i geokhimiya),
W74-03828 2J

Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

The Threshold of Sediment Movement Under Oscillatory Water Waves,
W74-04065 2J

Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments,
W74-04268 2K

BOTTOM TOPOGRAPHY
An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

BOUNDARY DISPUTE
Port of Portland V. an Island in Columbia River (Action to Quiet Title to Alluvial Island in Columbia River).
W74-03987 6E

BOUNDARY EFFECT
A Method for Determining the Static Pressure of a Well from Buildup Data,
W74-04162 8G

BOUNDARY LAYERS
Thermal Interaction of two Streams in Boundary-Layer Flow Separated by a Plate,
W74-04236 8B

BREEDER REACTORS
The Environmental and Regulatory Aspects of the Breeder Reactor,
W74-04238 5B

BROAD SOUND (AUST
Supratidal Environment and Geochemistry of Some Recent Dolomite Concretions, Broad Sound, Queensland, Australia,
W74-04069 2L

BROMEGRASS
Increasing Water Utilization Efficiency of a Pasture Grass by Increasing Aftermath Through Plant Selection,
W74-03773 3F

BROWN TROUT
The Dynamics of Brown Trout (Salmo trutta) and Sculpin (Cottus spp.) Populations as Indicators of Eutrophication,
W74-03904 5C

BRUSH
Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

BULGARIA
Some Data on the Water Economy and the Utilization of Water Resources in Bulgaria, Including Irrigation,
W74-03954 3F

BUOYANCY
Laminar and Axisymmetric Vertical Jets in a Stably Stratified Environment,
W74-04224 8B

BUREAU OF RECLAMATION PROJECTS
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

BURNING
Fire Climates in the Southwest,
W74-04130 4A

BUTADIENE (HEXACHLORO-)
Spectrophotometric Determination of Hexachlorobutadiene (HCBD) in Soil and Water, (In Russian),
W74-04293 5B

CADMIUM
The Chemistry of Cadmium in Natural Water--I: A Study of Cadmium Complex Formation Using the Cadmium Specific-Ion Electrode,
W74-03775 5B

Chronic Toxicity of a Copper, Cadmium and Zinc Mixture to the Fathead Minnow (Pimephales promelas Rafinesque),
W74-03873 5C

CALCITE
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

CALCIUM
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

CALCIUM ION
Cation Adsorption and Desorption Rates in Natural Water Studies,
W74-03765 5A

CALIBRATIONS
Explicit Calibration of the PILLS II System,
W74-04198 5D

CALIFORNIA
Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

West Side Crop Adaptability Study.
W74-03922 3F

Pyramid Lake Recreation Development Plan. Initial Facilities,
W74-03955 6B

Los Banos Reservoir Recreation Development Plan,
W74-03956 6B

People V. Mack: A Sportsman's Definition of Navigability,
W74-03967 6E

Looking for Pollution Under the Earth,
W74-04004 5B

Oakland Inner Harbor, Alameda County, California (Final Environmental Impact Statement).
W74-04027 8A

Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

Radio System Monitors Pump Stations,
W74-04148 8G

Application of Engineering to Well Construction and Development at Vernon,
W74-04167 8B

Evaluation of Groundwater Resources in Livermore Valley, California,
W74-04201 2F

Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

Monterey Bay Bibliography.
W74-04218 2L

Monterey Bay Bibliography. Supplement Number One.
W74-04219 2L

Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2L

An Oceanographic Investigation of Thermal Changes in Monterey Bay, California, September 1971 - January 1972,
W74-04223 2L

'Internal Waves' Advancing Along Submarine Canyons,
W74-04261 2E

Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California),
W74-04274 7C

CANADA
Occupationally Related Health Hazards in Wastewater Treatment Systems,
W74-03853 5C

Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

A Landscape Zonation for the Southern and Central Mackenzie River Valley Based on Terrain Permafrost Characteristics,
W74-04266 2C

Sediment Production in a Small Appalachian Watershed During Spring Runoff: The Eaton Basin, 1970-1972,
W74-04267 2J

CANAL CONSTRUCTION
A Bill to Authorize Extensions of the American Canal at El Paso, Texas.
W74-03986 6E

CANALS
Canals and Waterways.
W74-03990 6E

CAPITAL COSTS
An Investment Decision Model for Control Technology,
W74-04079 5G

CAPITAL INVESTMENT
An Evaluation of Urban Flood Plains,
W74-03756 6F

CARASSIUS-AURATUS-GIBELIO
The Feeding of Carassius auratus gibelio Bloch. From Kairakkum Reservoir, (In Russian),
W74-04109 2H

CARBON
Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

CARBON-CHLOROPHYLL RATIO
Temperature and Phytoplankton Growth in the Sea,
W74-04233 5C

CARBON DIOXIDE CONVERSION
Increasing the Processing Rate of Particulate Organic Matter in Streams,
W74-04202 5B

CARBON MONOXIDE
Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

CARBONATES
Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

CARBONATES (SOILS)
Gross Chemical Composition of Murgab Oasis Desertified and Ancient-Irrigation Soils (In Russian),
W74-04123 3C

CARP
Use of Phytophagous Fish to Control Aquatic Plants,
W74-04106 3B

CATFISHES
Investigations of Nutrition and Metabolism of Catfish and Utilization of Fisheries Products,
W74-03802 8I

CATHODES
Cation Adsorption and Desorption Rates in Natural Water Studies,
W74-03765 5A

CATHODIC PROTECTION
Corrosion and its Prevention in Waters,
W74-04151 8G

Cathodic Protection in Congested Areas,
W74-04159 8G

CATION ADSORPTION
Cation Adsorption and Desorption Rates in Natural Water Studies,
W74-03765 5A

Exchangeable Cations in Soils of the Dnieper Reservoirs,
W74-04255 2H

CATION CAPACITY
Determining the Cation Capacity of Humic Substances Using Flame Photometry, (In Estonian),
W74-04298 5A

Determination of Cation Capacity of Humic Acids by Thin Ash Content, (In Estonian),
W74-04299 5A

CATION CORRECTION FACTOR
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

CATION EXCHANGE
Exchangeable Cations in Soils of the Dnieper Reservoirs,
W74-04255 2H

CATIONS
Exchangeable Cations in Soils of the Dnieper Reservoirs,
W74-04255 2H

CEMENTATION (NATURAL)
Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

CEMENTS
Well Grouting and Well Protection,
W74-04164 8F

CENSUS
Study of Water Resources and Management.
W74-03970 6E

CENTRIFUGAL PUMPS
Operation and Maintenance of Centrifugal Pumps,
W74-04146 8C

Better Pump Installation,
W74-04154 8C

CERIUM
Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

CESIUM
Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

CHAENOCEPHALUS ACERATUS
Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

CHANNEL EROSION
River Response,
W74-03785 2E

On The Extent of Bottom Erosion in Large Rivers (Ueber den Umfang der Schlenerosion in grossen Gewaessern),
W74-04252 2J

CHANNEL IMPROVEMENT
Oakland Inner Harbor, Alameda County, California (Final Environmental Impact Statement).
W74-04027 8A

Physical Effects of Maintaining Drainage Channels in North Carolina's Coastal Area,
W74-04075 2E

CHANNEL MORPHOLOGY
River Response,
W74-03785 2E

Flow Over Alluvial Bed,
W74-03786 2E

Regime Problems of Rivers Formed in Sediment,
W74-03789 2J

CHANNELS
Oakland Inner Harbor, Alameda County, California (Final Environmental Impact Statement).
W74-04027 8A

CHATTAHOOCHEE RIVER
Dewatering of the Clayton Formation During Construction of the Walter F. George Lock and Dam, Fort Gaines, Clay County, Georgia,
W74-03819 4B

CHEAT LAKE (W
A Comparative Study of Plankton Respiration in an Acid Polluted Lake and Its Acid Free Embayments,
W74-03935 5C

An Analysis of the Zooplankton Community in an Acid Polluted Reservoir,
W74-03938 5C

Primary Productivity in Relation to Chemical Parameters in Cheat Lake, West Virginia,
W74-04089 5C

CHEDABUCTO BAY (NOVA SCOTIA)
Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

CHELATION
The Chemistry of Cadmium in Natural Water--I: A Study of Cadmium Complex Formation Using the Cadmium Specific-Ion Electrode,
W74-03775 5B

CHEMICAL ANALYSIS
Chemical Quality of Surface Water in the Eastern Oswego River Basin, New York,
W74-03817 5A

Simultaneous Determination of Ferrocyanide and Ferricyanide in Aqueous Solutions Using Infrared Spectrometry,
W74-03866 5A

Water Sampling and Laboratory Service,
W74-04024 5A

Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

CHEMICAL OXYGEN DEMAND
Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

Brave New World of TOC and TOD.
W74-03856 5A

CHEMICAL PRECIPITATION
Silcretes and Associated Silica Diagenesis in Southern Africa and Australia,
W74-04067 2J

Waste Water Impurity Level Affects Flocculation Efficiency of Polyelectrolytes,
W74-04195 5D

CHEMICAL PROPERTIES
Primary Productivity in Relation to Chemical Parameters in Cheat Lake, West Virginia,
W74-04089 5C

Stability Field Diagrams as Aids in Iron Chemistry Studies,
W74-04163 2K

CHEMICAL REACTIONS
Loss of Mercury from Water During Storage,
W74-04048 5A

CHEMICAL WASTES
Industrial Water Pollution Control--An Overview,
W74-04028 5D

CHIHUAHUAN DESERT
Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

CHILE
Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

CHIROMID LARVAE
The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

CHIRONOMUS ATTENUATUS
Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

CHLORELLA VULGARIS
The Relation Between the Synthesis of Inorganic Polyphosphate and Phosphate Uptake by Chlorella Vulgaris,
W74-04094 5C

CHLORIDES
The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

Nutrient Budgets in Rivers,
W74-03947 5C

CHLORINATION
The 'Tenacious' Iron Bacteria,
W74-04143 5B

CHLORINE
Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

CHLOROPHYLLA
Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

CHLOROPHYTA
North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

CHROMATOGRAPHY
Column Partition Chromatographic Determination of Sodium Alkane Monosulfonates,
W74-03867 5A

CHROMOGENIC REAGENTS
Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

CHROMOSOMES
Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

CHYDORID FOSSILS
Species Diversity of Chydorid Fossil Communities in the Mississippi Valley,
W74-03941 5C

CITIES
An Evaluation of Urban Flood Plains,
W74-03756 6F

General Powers of Cities and Towns--Streets, Alleys, Water-courses, Sewers--Control.
W74-03971 6E

CLAY MINERALS
The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

Behavior of Cohesive Material From a Soil Engineer's Viewpoint,
W74-03798 2J

Coagulation in Estuaries,
W74-04257 5B

Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

CLAYS
The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments,
W74-04268 2K

CLIMATIC DATA
West Side Crop Adaptability Study.
W74-03922 3F

CLOGGING
Borehole Recharge: The Compatability of Recharge Water With the Aquifer,
W74-03822 4B

Clogging in Recharge Wells, Causes and Cures,
W74-03824 4B

CLOSTRIDIUM
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

Temperature-Gradient Incubator for the Growth of Clostridia,
W74-03878 5A

COAGULATION
The Effectiveness of Sand Filters for the Removal of Colloidal Manganese Oxides from Water Using Selected Cations as Filter Aids,
W74-03893 5F

Coagulation in Estuaries,
W74-04257 5B

COAL MINE WASTES
Commonwealth V. Harmar Coal Co. (Denial of Mine Drainage Permits).
W74-03984 6E

COALS
Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

COASTAL ENGINEERING
Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

COASTAL WATERS
Portland Pipe Line Corporation V. Environmental Improvement Commission (Constitutionality of a State Statute).
W74-03988 6E

COASTS
Leasing of Areas for Cultivation of Marine Resources.
W74-03993 6E

Modern Sediments of Willapa Bay, Washington: A Coastal Plain Estuary,
W74-04209 2L

Time Dependent Shear Stress Beneath a Shoaling Wave,
W74-04213 2J

An Oceanographic Investigation of Thermal Changes in Monterey Bay, California, September 1971 - January 1972,
W74-04223 2L

Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

COATINGS
Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces.
W74-04156 8G

COHESIVE SOILS
Behavior of Cohesive Material From a Soil Engineer's Viewpoint,
W74-03798 2J

COHO SALMON
Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

COLIFORMS
Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

COLLOIDS
Coagulation in Estuaries,
W74-04257 5B

COLORADO
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

Water-Level Declines and Ground-Water Quality, Upper Black Squirrel Creek Basin, Colorado,
W74-03808 4B

Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

COLORIMETRY
Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

Colorimetric Determination of Boron in Aqueous Solutions and in Borosilicate Glass by Solvent Extraction,
W74-03862 5A

Absorptiometric Determination of Trace Amounts of Sulphide Ion in Water,
W74-04072 5A

COLUMBIA RIVER
Port of Portland V. an Island in Columbia River (Action to Quiet Title to Alluvial Island in Columbia River).
W74-03987 6E

Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

Environmental Surveillance at Hanford for CY-1970,
W74-04192 5B

Modern Sediments of Willapa Bay, Washington: A Coastal Plain Estuary,
W74-04209 2L

COMMERCIAL FISHING
The Economic Impact of the Ban on Commercial Fishing on Lake Pickwick,
W74-03910 6B

Fisherman Quotas: A Tentative Suggestion for Domestic Management,
W74-03991 6E

Some Aspects of the Theory of Exploitation of Fish Resources, (In Russian),
W74-04278 8I

COMMON PROPERTY
Common Property, Congestion, and Environmental Pollution,
W74-03958 6G

COMPETITION
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

COMPREHENSIVE PLANNING
Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience,
W74-03965 6B

COMPRESSIBILITY
Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

COMPUTER MODELS
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

COMPUTER PROGRAMS
The Optimal Expansion of a Water Resources Systems,
W74-03754 6A

Digital Computer Programs for the Cost Engineer.
W74-04087 5D

Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

CONDENSERS
The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

CONFERENCES
Wat's New in Deep-Well Injection,
W74-04265 5E

CONJUNCTIVE USE
Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

CONNATE WATER
The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments,
W74-04268 2K

CONNECTICUT
Water Resource Commission.
W74-03969 6E

Supervision of Dams and Reservoirs.
W74-03999 6E

Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

Remote Control is Coming,
W74-04153 8C

CONSERVATION
Petterson V. Froehlke (Challenge to Dredging Permit Issued by Corps of Engineers).
W74-03983 6E

CONSTRUCTION
Temporary Navigation Lock (Modification of Lock and Dam 53) (Final Environmental Impact Statement), Ohio River, Illinois and Kentucky.
W74-03966 8A

A Bill Authorizing the Secretary of the Army to Construct Floodwater Channels.
W74-03981 6E

CONSTRUCTION COSTS
An Investment Decision Model for Control Technology,
W74-04079 5G

CONTIGUOUS ZONE
Jurisdictional Problems Created by Artificial Islands.
W74-04022 6E

CONTINENTAL SHELF
On Wind Tides and Longshore Currents Over the Continental Shelf Due to Winds Blowing at an Angle to the Coast,
W74-04210 2E

Wave Shoaling,
W74-04216 2E

CONTINUOUS CULTURES
Mixed Culture Biooxidation of Phenol. II. Steady State Experiments in Continuous Culture,
W74-03880 5C

Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

CONTROL
General Powers of Cities and Towns--Streets, Alleys, Water-courses, Sewers--Control.
W74-03971 6E

CONTROL SYSTEMS
An Application Study in Water Distribution Control,
W74-03755 8C

Water Recovery and Solid Waste Processing for Aerospace and Domestic Applications.
W74-04053 5D

COOLING
The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

COOLING PONDS
Thermal Pollution and its Control,
W74-04234 5B

COOLING TOWERS
Explicit Calibration of the PILLS II System,
W74-04198 5D

Thermal Pollution and its Control,
W74-04234 5B

COOLING WATER
Evaluation of Thermal Pollution Control Alternatives,
W74-03791 5D

Heated Surface Discharges into Flowing Ambient Streams and Lakes,
W74-03794 5D

Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

COORDINATION
Improving Water Quality Management Planning in Nonmetropolitan Areas,
W74-04199 5G

COPPER
Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

Chronic Toxicity of a Copper, Cadmium and Zinc Mixture to the Fathead Minnow (Pimephales promelas Rafinesque),
W74-03873 5C

COPPER INDUSTRY
The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part I. Introduction and Executive Summary.
W74-04081 5G

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part II. Structure of the Industry.
W74-04082 5G

COPROSTANONE
Detection and Quantitative Measurement of Fecal Water Pollution Using a Solid-Injection Gas Chromatographic Technique and Fecal Steroids as a Chemical Index,
W74-03887 5A

CORAL
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

CORIOLIS FORCE
On Wind Tides and Longshore Currents Over the Continental Shelf Due to Winds Blowing at an Angle to the Coast,
W74-04210 2E

CORN (FIELD)
Arizona Indian Corn (Zea mays L.),
W74-03926 3F

Effect of Moisture Stress Upon Maize Production and Its Economic Significance,
W74-03948 3F

Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

Effect of Weather Conditions on Sporulation of Helminthosporium turcicum Pass,
W74-04296 3F

COROPHIUM-SOWINSKYI
Results of Acclimatization of Corophium sowinskyi (Mart.) in the Veselovsk Reservoir, (In Russian),
W74-04099 2H

CORRELATION COEFFICIANT
Some Causes of Failure in the Closeness of Correlative Connection Between Tree Species Transpiration and Meteorological Factors, (In Russian),
W74-04283 2D

CORROSION
Corrosion and its Prevention in Waters,
W74-04151 8G

Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces.
W74-04156 8G

Corrosion and Corrosion Control,
W74-04161 8G

The Relationship Between Galvanic Current and Dissolution Rates,
W74-04168 8G

CORROSION CONTROL
U-Tube Aeration,
W74-04046 5D

Corrosion and its Prevention in Waters,
W74-04151 8G

Corrosion and Corrosion Control,
W74-04161 8G

Synergistic Inhibition of Ferric Ion Corrosion During Chemical Cleaning of Metal Surfaces,
W74-04169 8G

COST ALLOCATION
A General Procedure for Consumption-Density Studies,
W74-04040 6D

COST ANALYSIS
Cost Analysis of Groundwater Supplies in the North Atlantic Region, 1970,
W74-03815 4B

The Impact of Costs Associated with New Environmental Standards upon the Petroleum Refining Industry. Part II. Structure of the Industry.
W74-04076 3E

The Economic Impact of Pollution Control. An Overview, a Summary of Research Studies.
W74-04077 5G

Economic Impact of Anticipated Paper Industry Pollution-Abatement Costs. Part III. Economic Analysis.
W74-04078 5G

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part I. Introduction and Executive Summary.
W74-04081 5G

Cost Analysis of Optional Methods of Shipboard Domestic Waste Disposal,
W74-04115 5D

Thermal Pollution and its Control,
W74-04234 5B

COST-BENEFIT ANALYSIS
Economic and Social Projects with Environmental Repercussions: A Shadow Project Approach,
W74-04085 6B

A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

COST-BENEFIT RATIO
Externalities, Shadow Prices, and Benefit-Cost Calculations,
W74-03960 6B

Discharge System for the A.D. Edmonston Pumping Plant,
W74-04038 3B

COST-BENEFIT THEORY
Economic and Social Projects with Environmental Repercussions: A Shadow Project Approach,
W74-04085 6B

COST COMPARISON
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

COST COMPARISONS
The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

Groundwater Recharge for Waste Water Reclamation and/or Storage of Supplies: A Cost Comparison with Conventional Methods,
W74-03825 5D

COST MINIMIZATION
Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

COSTS
Concepts of Externalities and Social Costs,
W74-03908 6B

The Economic Impact of the Ban on Commercial Fishing on Lake Pickwick,
W74-03910 6B

Residual Information Model with Application to Heat from Thermal Power Plants,
W74-03911 5B

Lower Cost Water Harvesting Methods,
W74-03952 3B

A New Approach to Domestic Water Rating,
W74-03963 6C

Digital Computer Programs for the Cost Engineer.
W74-04087 5D

COTTON
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

The Effect of Drought on the Cotton Water Regimen at Different Stages of its Development, (In Russian),
W74-03942 3F

Leaf Orientation of a Cotton Plant,
W74-04132 3F

Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

CROP PRODUCTION
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

CROP RESPONSE
West Side Crop Adaptability Study.
W74-03922 3F

Arizona Indian Corn (Zea mays L.),
W74-03926 3F

Irrigated Recreational Turfgrass with Sewage Effluent,
W74-03929 3C

CRUDE OIL
Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

CRUSTACEANS
Species Diversity of Chydorid Fossil Communities in the Mississippi Valley,
W74-03941 5C

Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

CRYSTAL RIVER (FLA)
Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

CULTIVARS
The Effect of Drought on the Cotton Water Regimen at Different Stages of its Development, (In Russian),
W74-03942 3F

CULTIVATION
Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

CULTURES
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

Thermophilic Fungi in a Municipal Waste Compost System,
W74-03875 5A

Temperature-Gradient Incubator for the Growth of Clostridia,
W74-03878 5A

Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

CULVERTS
Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

CURRENTS (WATER)
Theoretical Study of Longshore Currents on a Plane Beach,
W74-04214 2E

An Oceanographic Investigation of Thermal Changes in Monterey Bay, California, September 1971 - January 1972,
W74-04223 2L

'Internal Waves' Advancing Along Submarine Canyons,
W74-04261 2E

CYANIDE
Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

CYANOPHYTA
Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

CYTOLOGICAL STUDIES
The Relation Between the Synthesis of Inorganic Polyphosphate and Phosphate Uptake by Chlorella Vulgaris,
W74-04094 5C

DAM CONSTRUCTION
Dewatering of the Clayton Formation During Construction of the Walter F. George Lock and Dam, Fort Gaines, Clay County, Georgia,
W74-03819 4B

Discharge System for the A.D. Edmonston Pumping Plant,
W74-04038 3B

DAM FAILURE
Chicago and North Western Railway Company v. Tyler (Damage Action Caused by Flooding Waters).
W74-04012 6E

DAMS
Temporary Navigation Lock (Modification of Lock and Dam 53) (Final Environmental Impact Statement), Ohio River, Illinois and Kentucky.
W74-03966 8A

Supervision of Dams and Reservoirs.
W74-03999 6E

Conservation--Regulation of Streamflow.
W74-04016 6E

Discharge System for the A.D. Edmonston Pumping Plant,
W74-04038 3B

DANUBE RIVER
The Rotifers of the Submerged Mosses and Other Biotopes in the Dammed Regions of the Danube at the German-Austrian Frontier, (In German),
W74-04001 2I

The Inundation Region of the Danube, Km 1402,
W74-04080 2K

Preliminary Data About the Seasonal Changes and Vertical Stratification of Periphyton from the Middle Reach of the River Danube,
W74-04294 5A

DATA COLLECTIONS
Application of Remote Sensing to River Mechanics,
W74-03800 2E

DATA INTERPRETATION
Problems in Phenolics-Modeling Methods in the Ohio River at Wheeling, W. Va.,
W74-03849 5A

Identifying Source of Petroleum by Infrared Spectroscopy,
W74-03854 5A

DATA PROCESSING
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

Changes in Statistical Processing of Groundwater Level Measurements (Wandlungen bei der statistischen Aufbereitung von Grundwasserstandsmesswerten),
W74-04247 2F

DECISION MAKING
The Optimal Expansion of a Water Resources Systems,
W74-03754 6A

Water Resources and Social Choices,
W74-03951 6B

An Investment Decision Model for Control Technology,
W74-04079 5G

DEGRADATION (DECOMPOSITION)
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

DEGRADATION (STREAM)
Indications of Streambed Degradation in the Willamette Valley,
W74-03770 2J

On The Extent of Bottom Erosion in Large Rivers (Ueber den Umfang der Schlenerosion in grossen Gewaessern),
W74-04252 2J

DEICING SALTS
Effects of Deicing Chemicals Upon Ground and Surface Waters (Initial Program Development),
W74-04149 5B

DELAWARE RIVER
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

DELAWARE RIVER BASIN COMMISSION
Interstate Compacts and Regional Water Resources Planning and Management,
W74-04000 6E

DENSITY
Measuring Volumes of Sedimentary Grains,
W74-04056 2J

DEPLETION ALLOWANCE
The Ground-Water Depletion Allowance Under the Federal Income Tax,
W74-03962 6E

DEPOSITION (SEDIMENTS)
Coagulation in Estuaries,
W74-04257 5B

DESERT PLANTS
Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

DESIGN
Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

Corrosion and its Prevention in Waters,
W74-04151 8G

Drainage Design as Influenced by Conditions in the Vicinity of the Drain Line,
W74-04200 4A

DESIGN CRITERIA
A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

DETECTION LIMITS
Colorimetric Determination of Boron in Aqueous Solutions and in Borosilicate Glass by Solvent Extraction,
W74-03862 5A

DETERGENTS
Phosphates and the Environment,
W74-04107 5C

DETRITUS
Increasing the Processing Rate of Particulate Organic Matter in Streams,
W74-04202 5B

DEVELOPING COUNTRIES
Water-Supply Planning in Developing Countries,
W74-04117 6A

DEWATERING
Dewatering of the Clayton Formation During Construction of the Walter F. George Lock and Dam, Fort Gaines, Clay County, Georgia,
W74-03819 4B

DIAGENESIS
Silcretes and Associated Silica Diagenesis in Southern Africa and Australia,
W74-04067 2J

Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

Supratidal Environment and Geochemistry of Some Recent Dolomite Concretions, Broad Sound, Queensland, Australia,
W74-04069 2L

Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

DIATOMACEOUS POPULATIONS
The Diatomaceous Populations in the Basin of the Meurthe River: Attempt at an Hydrobiological Synthesis, (In French),
W74-04288 2I

DIATOMS
The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

DICTIONARIES
Encyclopedic Dictionary of Exploration Geophysics,
W74-04142 8B

DIEL MIGRATION
Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

DIFFUSION
Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

Water Vapor Movement Through Mulches Under Field Conditions,
W74-03784 2G

DIFFUSIVITY
Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

DIPTERA
Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

DISASTERS
Chicago and North Western Railway Company v. Tyler (Damage Action Caused by Flooding Waters).
W74-04012 6E

DISCHARGE
United States v. United States Steel (Refuse Act Violation).
W74-04011 6E

DISCHARGE MEASUREMENT
Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

DISCHARGE (WATER)
A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

DISINFECTION
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

DISPERSION
Dispersion of Contaminants Attached to Sediment Bed Load,
W74-03797 5B

DISSOLVED OXYGEN
Aeration at Weirs.
W74-04113 5C

DISSOLVED SOLIDS
Borehole Recharge: The Compatability of Recharge Water With the Aquifer,
W74-03822 4B

DISTRIBUTION
An Ecological Evaluation of a Thermal Discharge. Part II: The Distribution of Phytoplankton and Primary Productivity Near the Western Shore of Lake Erie,
W74-03936 5C

An Ecological Evaluation of a Thermal Discharge. Part III: The Distribution of Zooplankton Along the Western Shore of Lake Erie,
W74-04095 5C

Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

DISTRIBUTION PATTERNS
Lognormal Size Distribution of Particulate Matter,
W74-04058 2J

A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

DITCHES
Schwermann v. Reinhart (Drainage Ditch Construction in Wildlife Conservation Area).
W74-03997 6E

DIVERSION
Czarnick v. Loup River Public Power District (Liability of Power District for Damage Resulting From Negligence).
W74-04021 6E

DOLOMITE
Supratidal Environment and Geochemistry of Some Recent Dolomite Concretions, Broad Sound, Queensland, Australia,
W74-04069 2L

DOLPHINS
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

DOMESTIC WASTES
The Characterization and Influence of Domestic Drain Effluents on the Red Cedar River,
W74-03895 5B

Cost Analysis of Optional Methods of Shipboard Domestic Waste Disposal,
W74-04115 5D

DOMESTIC WATER
A New Approach to Domestic Water Rating,
W74-03963 6C

DRAINAGE
A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

Drainage Design as Influenced by Conditions in the Vicinity of the Drain Line,
W74-04200 4A

DRAINAGE CHANNELS
Physical Effects of Maintaining Drainage Channels in North Carolina's Coastal Area,
W74-04075 2E

DRAINAGE EFFECTS
Schwermann v. Reinhart (Drainage Ditch Construction in Wildlife Conservation Area).
W74-03997 6E

DRAINAGE PRACTICES
Schwermann v. Reinhart (Drainage Ditch Construction in Wildlife Conservation Area).
W74-03997 6E

DRAINAGE SYSTEMS
Drainage.
W74-04014 6E

DRAINS
Drainage Design as Influenced by Conditions in the Vicinity of the Drain Line,
W74-04200 4A

DRAWDOWN
Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

DREDGE SPOILS
Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

DREDGING
Oakland Inner Harbor, Alameda County, California (Final Environmental Impact Statement).
W74-04027 8A

DRIFT
A Comparison of Invertebrate Drift in Three Michigan Streams,
W74-03902 5B

DRIFT MEASUREMENT
Explicit Calibration of the PILLS II System,
W74-04198 5D

DRILLING FLUIDS
Filtration Behavior of Circulating Drilling Fluids,
W74-04141 8B

DROUGHT EFFECTS
The Effect of Drought on the Cotton Water Regimen at Different Stages of its Development, (In Russian),
W74-03942 3F

DROUGHT RESISTANCE
Drought Resistance of Pear Varieties of the Main Ecological-Geographic Groups, (In Russian),
W74-04220 3F

DRY AIR COOLING
The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

DRY FARMING
Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

DUNES
Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

Internal Geometry and Origin of Vegetated Coastal Sand Dunes,
W74-04061 2J

Pseudo-Crosslamination Formed by Climbing Adhesion Ripples,
W74-04062 2J

ERGS,
W74-04264 2J

DYNAMIC PROGRAMING
Alternative Futures Using the Wollman-Bonem Models,
W74-03888 6A

DYNAMIC PROGRAMMING
Sequential Stochastic Optimization for Reservoir System,
W74-03914 4A

ECOLOGICAL DISTRIBUTION
An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

ECOLOGICAL STUDIES
Bioecological Observations on Gambusia affinis Holbrooki Girard Living in Sulfurous, Warm and Brackish Waters (In Italian),
W74-04122 2I

ECOLOGY
Estuaries Under Attack,
W74-04033 6G

The Environmental Cost of Economic Growth,
W74-04088 5G

Productivity of the River Thames at Reading,
W74-04093 5C

ECONOMIC EFFICIENCY
Opportunity Costs and Water Resource Use,
W74-03909 6B

Water-Supply Planning in Developing Countries,
W74-04117 6A

ECONOMIC GROWTH
The Environmental Cost of Economic Growth,
W74-04088 5G

ECONOMIC IMPACT
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

Social Accounting Approaches to Water Resource Use in Economic Development.
W74-03907 6B

The Economic Impact of the Ban on Commercial Fishing on Lake Pickwick,
W74-03910 6B

The Economic Impact of Pollution Control. An Overview, a Summary of Research Studies.
W74-04077 5G

Economic Impact of Anticipated Paper Industry Pollution-Abatement Costs. Part III. Economic Analysis.
W74-04078 5G

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part I. Introduction and Executive Summary.
W74-04081 5G

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part II. Structure of the Industry.
W74-04082 5G

The Environmental Cost of Economic Growth,
W74-04088 5G

ECONOMIC MODELS
Systems Simulation of Economic Factors and Their Relation to the Water System of Wyoming's Platte River Basin,
W74-03892 6A

ECONOMICS
Residual Information Model with Application to Heat from Thermal Power Plants,
W74-03911 5B

ECOSYSTEMS
A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

EDTA
Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

EFFLUENTS
Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

Comparison of Measured and Calculated Radiation Exposure from a Boiling Water Reactor Plume,
W74-04175 5B

ELECTRIC POWER
Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

ELECTRIC POWER PRODUCTION
The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

ELECTRICAL EQUIPMENT
Guide to Selecting Programmable DC Power Supplies,
W74-03863 7C

ELECTRICAL WELL LOGGING
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

ELECTRO-OPTIC INSTRUMENTS
Explicit Calibration of the PILS II System,
W74-04198 5D

ELECTROCHEMISTRY
Cation Adsorption and Desorption Rates in Natural Water Studies,
W74-03765 5A

Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXI. Introduction and Instrumentation,
W74-03859 5A

Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXII. Symmetrical Periodic Current Differential Electrolytic Potentiometry in Oxidation - Reduction Titrimetry,
W74-03860 5A

An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level,
W74-04104 5A

The Relationship Between Galvanic Current and Dissolution Rates,
W74-04168 8G

Synergistic Inhibition of Ferric Ion Corrosion During Chemical Cleaning of Metal Surfaces,
W74-04169 8G

ELECTRODES
Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXI. Introduction and Instrumentation,
W74-03859 5A

Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXII. Symmetrical Periodic Current Differential Electrolytic Potentiometry in Oxidation - Reduction Titrimetry,
W74-03860 5A

Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode,
W74-03864 5A

A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

ELECTROLYTES
Waste Water Impurity Level Affects Flocculation Efficiency of Polyelectrolytes,
W74-04195 5D

ELECTRON MICROSCOPY
Investigation of the Microflora of Swamp Ore and Lake Water by the Method of Electron Microscopy, (In Russian),
W74-04292 5A

EMERGENCE
Effect of Low Oxygen Concentration on Survival and Emergence of Aquatic Insects,
W74-04100 5C

EMINENT DOMAIN
Eminent Domain.
W74-04020 6E

ENERGY BUDGET
Simulation of the Energy Balance of a Greenhouse,
W74-04126 2I

ENERGY CONSERVATION
On the Breaking of Waves Arriving at an Angle to the Shore,
W74-04217 2H

ENERGY FLUX
Wave Shoaling,
W74-04215 2E

ENGINEERING GEOLOGY
Jurisdictional Problems Created by Artificial Islands.
W74-04022 6E

ENTHALPY
The Interaction of Water with Organic Solute Species,
W74-03762 1B

ENTROPY
The Interaction of Water with Organic Solute Species,
W74-03762 1B

ENVIRONMENT
Common Property, Congestion, and Environmental Pollution,
W74-03958 6G

Economic and Social Projects with Environmental Repercussions: A Shadow Project Approach,
W74-04085 6B

Environmental Radioactivity - Ispra 1971,
W74-04176 5B

ENVIRONMENTAL CONTROL
Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

Disclosure of Unlawful Oil Discharge Provides Immunity from Prosecution,
W74-03989 5G

An Investment Decision Model for Control Technology,
W74-04079 5G

Some Models for the Economic Evaluation of the Environment,
W74-04083 5G

ENVIRONMENTAL COSTS
The Environmental Cost of Economic Growth,
W74-04088 5G

ENVIRONMENTAL EFFECTS
Supervision of Dams and Reservoirs.
W74-03999 6E

Friends of the Earth v. Armstrong (Environmental Protection Suit).
W74-04007 6E

Oakland Inner Harbor, Alameda County, California (Final Environmental Impact Statement).
W74-04027 8A

ENVIRONMENTAL IMPACT STATEMENT
Temporary Navigation Lock (Modification of Lock and Dam 53) (Final Environmental Impact Statement), Ohio River, Illinois and Kentucky.
W74-03966 8A

ENVIRONMENTAL IMPACT STATEMENTS
Ohio v. Callaway (Injunction Action for Failure to Comply with Nepa).
W74-04009 6E

Oakland Inner Harbor, Alameda County, California (Final Environmental Impact Statement).
W74-04027 8A

ENVIRONMENTAL QUALITY
Some Models for the Economic Evaluation of the Environment,
W74-04083 5G

ENVIRONMENTAL SANITATION
Littering of Property and Waters.
W74-04017 6E

ENVIRONMENTAL STANDARDS
Let's Enforce the Rules,
W74-03891 6E

ENZYMATIC INHIBITORS
Test for Anticholinesterase Materials in Water,
W74-03838 5A

EQUIVALENT SODIUM CHLORIDE
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

EROSION
Behavior of Cohesive Material From a Soil Engineer's Viewpoint,
W74-03798 2J

Upslope Erosion Analysis,
W74-03799 2J

The Threshold of Sediment Movement Under Oscillatory Water Waves,
W74-04065 2J

On The Extent of Bottom Erosion in Large Rivers (Ueber den Umfang der Schlenerosion in grossen Gewaessern),
W74-04252 2J

Sediment Production in a Small Appalachian Watershed During Spring Runoff: The Eaton Basin, 1970-1972,
W74-04267 2J

EROSION CONTROL
Shore Erosion Control.
W74-03974 6E

Experiences with the Correction of Disordered Streams of the Alpine Type, (In Italian),
W74-04276 4D

EROSION CONTROLL
Soil Conservation Districts.
W74-03998 6E

EROSIVE CONTROL
Anti-Erosive Role of Natural Plants in Low Foot-Hills Bordering the Ferghana Basin, (In Russian),
W74-04287 4D

ESTUARIES
Estuaries Under Attack,
W74-04033 6G

Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

Modern Sediments of Willapa Bay, Washington: A Coastal Plain Estuary,
W74-04209 2L

The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

Coagulation in Estuaries,
W74-04257 5B

The Influence of Suspended Particles on the Precipitation of Iron in Natural Waters,
W74-04272 5B

ESTUARINE ENVIRONMENT
Estuaries Under Attack,
W74-04033 6G

Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

ESTUARY
Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

ETHERS
Formation of Pentafluorobenzyl Derivatives for the Identification and Quantitation of Acid and Phenol Pesticide Residues,
W74-03850 5A

EUTROPHIC LAKE
Primary Production and Destruction of Organic Matter in 2 Lakes of Different Types, (In Russian),
W74-03944 5C

EUTROPHIC LAKES
Utilization of Aromatic Compounds by Benthic Microorganisms of a Eutrophic Lake,
W74-04295 5C

EUTROPHICATION
The Dynamics of Brown Trout (Salmo trutta) and Sculpin (Cottus spp.) Populations as Indicators of Eutrophication,
W74-03904 5C

Causes and Control of Algal Blooms in Spiritwood Lake, North Dakota,
W74-03906 5C

Summary Report of the Agreed Monitoring Projects on Eutrophication of Waters.
W74-03940 5C

Preliminary Survey of Golcuk, A Eutrophic Mountain Lake in Western Turkey,
W74-03946 5C

EVALUATION
Some Models for the Economic Evaluation of the Environment,
W74-04083 5G

EVAPORATION
Water Vapor Movement Through Mulches Under Field Conditions,
W74-03784 2G

EVAPOTRANSPIRATION
A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

EXCHANGE DIFFUSION
Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

EXTERNAL DISECONOMIES
Regional Interdependencies and External Diseconomies,
W74-03912 6B

EXTERNALITIES
Social Accounting Approaches to Water Resource Use in Economic Development.
W74-03907 6B

Concepts of Externalities and Social Costs,
W74-03908 6B

Externalities, Environmental Pollution and Allocation in Space: A General Equilibrium Approach,
W74-04084 5G

FAIRBANKS (ALAS)
Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

FARM WASTES
Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

FATHEAD MINNOW
Chronic Toxicity of a Copper, Cadmium and Zinc Mixture to the Fathead Minnow (Pimephales promelas Rafinesque),
W74-03873 5C

FECAL POLLUTION
Detection and Quantitative Measurement of Fecal Water Pollution Using a Solid-Injection Gas Chromatographic Technique and Fecal Steroids as a Chemical Index,
W74-03887 5A

FECUNDITY
Fecundity of the Grass Carp Ctenopharyngodon idella (Val.) in the Amur Basin (In Russian),
W74-04121 2I

FEDERAL GOVERNMENT
National Water Commission Reports.
W74-03890 6B

Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

FEDERAL WATER POLLUTION CONTROL ACT
Assault on a Lake,
W74-03975 5G

The Future of Water Quality Control,
W74-04026 5G

FEEDING
The Feeding of Carassius auratus gibelio Bloch. From Kairakkum Reservoir, (In Russian),
W74-04109 2H

FERRICYANIDES
Simultaneous Determination of Ferrocyanide and Ferricyanide in Aqueous Solutions Using Infrared Spectrometry,
W74-03866 5A

FERROCYANIDES
Simultaneous Determination of Ferrocyanide and Ferricyanide in Aqueous Solutions Using Infrared Spectrometry,
W74-03866 5A

FERTILIZER
Looking for Pollution Under the Earth,
W74-04004 5B

FERTILIZERS
Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

FILTER CAKE THICKNESS
Filtration Behavior of Circulating Drilling Fluids,
W74-04141 8B

FILTRATION
The Effectiveness of Sand Filters for the Removal of Colloidal Manganese Oxides from Water Using Selected Cations as Filter Aids,
W74-03893 5F

Recycled Water,
W74-03976 5D

Filtration Behavior of Circulating Drilling Fluids,
W74-04141 8B

FINANCING
Shore Erosion Control.
W74-03974 6E

FINITE DIFFERENCES
Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

FINITE ELEMENT ANALYSIS
Evaluation of Groundwater Resources in Livermore Valley, California,
W74-04201 2F

FISH
Improvements in the Wet Oxidation-Dithizone Method for Determining Low Mercury Levels in Food,
W74-03869 5A

Use of Phytophagous Fish to Control Aquatic Plants,
W74-04106 3B

FISH BEHAVIOR
Fish Behavior Related to Thermal Pollution,
W74-03795 5C

Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

FISH DIETS
Investigations of Nutrition and Metabolism of Catfish and Utilization of Fisheries Products,
W74-03802 8I

FISH EGGS
Natural Radiation Loads on the Eggs of Marine and Fresh Water Organisms,
W74-04182 5C

Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

FISH FOOD
Feeding and Food Relationships of the Trout Salmo ischchan Kessler and Whitefish Coregonus lavaretus Ludoga Poliakow of Lake Sevan, (In Russian),
W74-04203 2H

FISH HATCHERY WASTES
Potamological Effects of Fish Hatchery Discharge on the Jordan River, Northern Lower Michigan,
W74-03903 5C

FISH MANAGEMENT
Investigations of Nutrition and Metabolism of Catfish and Utilization of Fisheries Products,
W74-03802 8I

Fisherman Quotas: A Tentative Suggestion for Domestic Management,
W74-03991 6E

Some Aspects of the Theory of Exploitation of Fish Resources, (In Russian),
W74-04278 8I

FISH PHYSIOLOGY
Regulation of Brain and Eye Temperatures by the Bluefin Tuna,
W74-04239 5C

FISH PONDS
Chemical Changes in the Water and Accumulation Stratum of Soils in Ponds Fertilized with Beet-Sugar Factory Wastes,
W74-04110 5C

FISH POPULATIONS
The Dynamics of Brown Trout (Salmo trutta) and Sculpin (Cottus spp.) Populations as Indicators of Eutrophication,
W74-03904 5C

FISH REGULATION (SEASONAL)
Closed Season Regulation for Table Fish in the Sukhandar'ya River Basin, (In Russian),
W74-04290 8I

FISH SPECIES
Species Composition of Fishes in the Sanzar River, (In Russian),
W74-03945 2I

FISHERIES
Investigations of Nutrition and Metabolism of Catfish and Utilization of Fisheries Products,
W74-03802 8I

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies,
W74-03932 8I

Ohio Mussel Fisheries Investigation. Part II: Water Chemistry and Sediment Analyses,
W74-03933 5C

Monterey Bay Bibliography.
W74-04218 2L

Monterey Bay Bibliography. Supplement Number One.
W74-04219 2L

FISHERIES (EXPLOITATION)
Some Aspects of the Theory of Exploitation of Fish Resources, (In Russian),
W74-04278 8I

FLAME PHOTOMETRY
Application of the Carbon Cup Atomisation Technique in Water Analysis by Atomic-Absorption Spectroscopy,
W74-04073 5A

Determining the Cation Capacity of Humic Substances Using Flame Photometry, (In Estonian),
W74-04298 5A

FLOCCULATION
Waste Water Impurity Level Affects Flocculation Efficiency of Polyelectrolytes,
W74-04195 5D

FLOOD CONTROL
A Bill Authorizing the Secretary of the Army to Construct Floodwater Channels.
W74-03981 6E

Flood Damage Prevention-Construction of Buildings,
W74-03992 6E

Drainage.
W74-04014 6E

FLOOD DAMAGE
An Evaluation of Urban Flood Plains,
W74-03756 6F

Soil and Water Conservation Commission: Powers of Supervisors.
W74-04003 6E

Chicago and North Western Railway Company v. Tyler (Damage Action Caused by Flooding Waters).
W74-04012 6E

Czarnick v. Loup River Public Power District (Liability of Power District for Damage Resulting From Negligence).
W74-04021 6E

FLOOD DATA
Flood Profiles in the Umpqua River Basin, Oregon, Part 2,
W74-03803 4A

FLOOD FORECASTING
Floods in Iowa: Technical Manual for Estimating Their Magnitude and Frequency,
W74-03805 4A

Statement of Progress on Investigation and Analysis of Flood Hydrographs from Small Drainage Basins in South Dakota,
W74-03821 4A

FLOOD FREQUENCY
Flood Profiles in the Umpqua River Basin, Oregon, Part 2,
W74-03803 4A

Floods in Iowa: Technical Manual for Estimating Their Magnitude and Frequency,
W74-03805 4A

Statement of Progress on Investigation and Analysis of Flood Hydrographs from Small Drainage Basins in South Dakota,
W74-03821 4A

FLOOD PLAIN ZONING
Water Resource Commission.
W74-03969 6E

FLOOD PLAINS
An Evaluation of Urban Flood Plains,
W74-03756 6F

FLOOD PROFILES
Flood Profiles in the Umpqua River Basin, Oregon, Part 2,
W74-03803 4A

Floods of the 1970 and 1971 Water Years in Mississippi,
W74-03816 2E

FLOOD PROTECTION
A Bill Authorizing the Secretary of the Army to Construct Floodwater Channels.
W74-03981 6E

Flood Damage Prevention-Construction of Buildings,
W74-03992 6E

Soil and Water Conservation Commission: Powers of Supervisors.
W74-04003 6E

FLOODING
Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

FLOODPLAINS
Structure and Productivity of the Phytomass of Gigantic Bunch-Forming Grasses in the Amu Darya Floodplain, (In Russian),
W74-04282 2I

FLOODS
Floods of the 1970 and 1971 Water Years in Mississippi,
W74-03816 2E

FLORA
Investigation of the Microflora of Swamp Ore and Lake Water by the Method of Electron Microscopy, (In Russian),
W74-04292 5A

FLORA (SAPROPHYTIC)
Proteolytic Activity of Saprophytic Microflora in the Dneprodzerzhinskoe Reservoir, (In Russian),
W74-03949 5C

FLORIDA
Recycled Water,
W74-03976 5D

Hillsbourgh County Environmental Protection Commission v. Frandorson Properties (Deliberate Destruction of Mangroves in Tidal Waters Not Forbidden).
W74-03996 6E

Conservation, Geology and Water Resources,
W74-04013 6E

Drainage.
W74-04014 6E

Florida Water Resources Act of 1972.
W74-04019 6A

Offenses Concerning Public Roads and Navigable Waters.
W74-04029 6E

Effects on Water Quality in the Shallow Aquifer due to the Operation of the Cross State Dump, Palm Beach County, Florida,
W74-04052 5B

Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

Effects of the Feeder Canal on the Water Resources of the Fort Lauderdale Prospect Well-Field Area,
W74-04259 5G

FLORIDA WATER RESOURCES ACT
Florida Water Resources Act of 1972.
W74-04019 6A

FLOW
Flow Over Alluvial Bed,
W74-03786 2E

Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

Self-Similar Solutions for a Three-Component Axisymmetrical Flow of a Viscous Fluid,
W74-04248 8B

The Structural-Continuum Theory of Dilute Suspensions of Rigid Ellipsoidal Particles,
W74-04249 8B

Investigation of the Velocity Structure in the Bottom Region of A Turbulent Wave Flow,
W74-04250 8B

FLOW AUGMENTATION
Drainage.
W74-04014 6E

FLOW MEASUREMENT
Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

FLOW REGULATION
Water Supply in the Volga Basin and its Effect on Strugeon Reproduction, Family Acipenseridae Under Conditions of Natural and Regulated Flow, (In Russian),
W74-04279 8I

FLOW RESISTANCE
Flow Resistance over Short Simulated Vegetation and Various Tall Simulated Vegetation Groupings on Flow Resistance and Sediment Yield,
W74-03787 2E

FLOW SEPARATION
Fabric Boom Concept for Containment and Collection of Floating Oil,
W74-04044 5G

FLOWMETERS
Semi-Portable Sheet Metal Flume for Automated Irrigation,
W74-04138 3F

FLUID FRICTION
Flow Resistance over Short Simulated Vegetation and Various Tall Simulated Vegetation Groupings on Flow Resistance and Sediment Yield,
W74-03787 2E

FLUID MECHANICS
Transient Heat and Mass Transfer in Fully Developed Laminar Tube Flows,
W74-04237 8B

Self-Similar Solutions for a Three-Component Axisymmetrical Flow of a Viscous Fluid,
W74-04248 8B

The Structural-Continuum Theory of Dilute Suspensions of Rigid Ellipsoidal Particles,
W74-04249 8B

Investigation of the Velocity Structure in the Bottom Region of A Turbulent Wave Flow,
W74-04250 8B

FLUMES
Flume Experiments on the Transition from Ripples to Lower Flat Bed with Increasing Sand Size,
W74-04063 2J

Semi-Portable Sheet Metal Flume for Automated Irrigation,
W74-04138 3F

FLUORINE
Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode,
W74-03864 5A

FOG
Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2I

FOG BANK
Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2I

FOOD PROCESSING INDUSTRY
Chemical Changes in the Water and Accumulation Stratum of Soils in Ponds Fertilized with Beet-Sugar Factory Wastes,
W74-04110 5C

FOODS
Improvements in the Wet Oxidation-Dithizone Method for Determining Low Mercury Levels in Food,
W74-03869 5A

FORAGE CROPS
Investigation of the Dynamics of the Moisture State of the Soil Under Several Years of Forage Crops and Under Sainfoin, (In Czech),
W74-03917 3F

FORAGE GRASSES
Increasing Water Utilization Efficiency of a Pasture Grass by Increasing Aftermath Through Plant Selection,
W74-03773 3F

FORAGE LEGUMES
Alfalfa Quality: Is There a Difference,
W74-03930 3F

FORAGES
Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

FORECASTING
Problems in Phenolics-Modeling Methods in the Ohio River at Wheeling, W. Va.,
W74-03849 5A

A Survey of Prediction Intervals and Their Applications,
W74-03858 7C

The Pollution Sub-System,
W74-03964 6G

A General Procedure for Consumption-Density Studies,
W74-04040 6D

FOREST FIRES
Fire Climates in the Southwest,
W74-04130 4A

FOREST WATERSHEDS
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

FORESTATION
Field Shelterbelt Afforestation and Greenery Planting,
W74-03883 3F

FORESTS
Architecture of Riparian Forest Vegetation of Rivers and Creeks of French Guiana,
W74-04285 2I

FORT LAUDERDALE (FLA)
Effects of the Feeder Canal on the Water Resources of the Fort Lauderdale Prospect Well-Field Area,
W74-04259 5G

FORT WAYNE (IND)
Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

FOSSIL FUELS
Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

FRACTURE PERMEABILITY
Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

FRANCE (CAMARGUE)
Seasonal Variations of the Salinity in Some Profiles and in the Water Table of the Sodic Soils of Camargue: Preliminary Results (In French),
W74-04124 2G

FRANCE (MEURTHE RIVER BASIN)
The Diatomaceous Populations in the Basin of the Meurthe River: Attempt at an Hydrobiological Synthesis, (In French),
W74-04288 2I

FRANCE (PROVENCE)
Appreciation of the Fitness for Utilization of the Soils of Provence,
W74-04125 2G

FREE SURFACES
Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

FRENCH GUIANA
Architecture of Riparian Forest Vegetation of Rivers and Creeks of French Guiana,
W74-04285 2I

FREQUENCY CURVES
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

FRESHWATER FISH
A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

FROGS
Radiation Reaction of the Adenohypophysis-Gonads System in Cold-Blooded Animals,
W74-04180 5C

The Effect of Thermal Acclimation on Heart rate and Oxygen Consumption of Frogs During Submergence,
W74-04242 5A

Seasonal Variation in Heart Rate Response to Core Temperature Changes,
W74-04244 5C

FROZEN SOILS
The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

FULVIC ACIDS
Determining the Cation Capacity of Humic Substances Using Flame Photometry, (In Estonian),
W74-04298 5A

FUNGI
Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

Effect of Weather Conditions on Sporulation of Helminothosporium turcicum Pass,
W74-04296 3F

GALVANIC CORROSION
The Relationship Between Galvanic Current and Dissolution Rates,
W74-04168 8G

GAMBUSIA-AFFINIS-HOLBROOKI
Bioecological Observations on Gambusia affinis Holbrooki Girard Living in Sulfurous, Warm and Brackish Waters (In Italian),
W74-04122 2I

GARBAGE DUMPS
Effects on Water Quality in the Shallow Aquifer due to the Operation of the Cross State Dump, Palm Beach County, Florida,
W74-04052 5B

GAS CHROMATOGRAPHY
Formation of Pentafluorobenzyl Derivatives for the Identification and Quantitation of Acid and Phenol Pesticide Residues,
W74-03850 5A

Detection and Quantitative Measurement of Fecal Water Pollution Using a Solid-Injection Gas Chromatographic Technique and Fecal Steroids as a Chemical Index,
W74-03887 5A

GASES
Comparison of Measured and Calculated Radiation Exposure from a Boiling Water Reactor Plume,
W74-04175 5B

GASOLINE
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

GENERAL EQUILIBRIUM ANALYSIS
Externalities, Environmental Pollution and Allocation in Space: A General Equilibrium Approach,
W74-04084 5G

GEOCHEMISTRY
Basic Types of Recent Bottom Sediments of the Mediterranean Sea, Their Mineralogy and Geochemistry (Osnovnyye tipy sovremennykh donnykh osadkov Sredizemnogo morya, ikh mineralogiya i geokhimiya),
W74-03828 2J

GEODESY
Encyclopedic Dictionary of Exploration Geophysics,
W74-04142 8B

GEOLOGICAL SURVEYS
Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California),
W74-04274 7C

GEOLOGY
Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

A Harbinger: The Senkaku Islands.
W74-04023 6E

GEOMORPHOLOGY
Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

GEOPHYSICS
Encyclopedic Dictionary of Exploration Geophysics,
W74-04142 8B

GEORGIA
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

Chemical and Biological Survey of the Savannah River Adjacent to Elba Island,
W74-03804 5B

Dewatering of the Clayton Formation During Construction of the Walter F. George Lock and Dam, Fort Gaines, Clay County, Georgia,
W74-03819 4B

GERMANY
Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

Changes in Statistical Processing of Groundwater Level Measurements (Wandlungen bei der statistischen Aufbereitung von Grundwasserstandsmesswerten),
W74-04247 2F

The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

On The Extent of Bottom Erosion in Large Rivers (Ueber den Umfang der Schlenerosion in grossen Gewaessern),
W74-04252 2J

GERMINATION
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

GIBBS FREE ENERGY
The Interaction of Water with Organic Solute Species,
W74-03762 1B

GLACIATION
Data of Glaciological Studies. Chronicle and Discussions (Materialy glyatsiologicheskikh issledovaniy. Khronika, Obsuzhdeniya).
W74-03835 2C

GLACIERS
Data of Glaciological Studies. Chronicle and Discussions (Materialy glyatsiologicheskikh issledovaniy. Khronika, Obsuzhdeniya).
W74-03835 2C

GLACIOLOGY
Data of Glaciological Studies. Chronicle and Discussions (Materialy glyatsiologicheskikh issledovaniy. Khronika, Obsuzhdeniya).
W74-03835 2C

GOLDFISH
Mercury: Uptake by the Goldfish, Carassius auratus, from Low Concentrations in Water and Its Tissue Distribution,
W74-03898 5C

Dependence of the Growth of White Bream and Goldfish on Environment, (In Byelorussian),
W74-04090 2H

GONADS
Radiation Reaction of the Adenohypophysis-Gonads System in Cold-Blooded Animals,
W74-04180 5C

GOVERNMENT FINANCE
Kentucky Pollution Abatement Authority.
W74-04002 6E

GOVERNMENTAL INTERRELATIONS
Port, Harbor and Terminal Districts; Powers and Duties; Bonds.
W74-03982 6E

Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

GRAIN SORGHUM
Grain Sorghum Response to Trickle and Subserface Irrigation,
W74-04137 3F

GRANTS
Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

Kentucky Pollution Abatement Authority.
W74-04002 6E

GRAPHICAL ANALYSIS
Opportunity Costs and Water Resource Use,
W74-03909 6B

Common Property, Congestion, and Environmental Pollution,
W74-03958 6G

GRAPHICAL METHODS
A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

A Method for Determining the Static Pressure of a Well from Buildup Data,
W74-04162 8G

GRASS CARP
Fecundity of the Grass Carp Ctenopharyngodon idella (Val.) in the Amur Basin (In Russian),
W74-04121 2I

GRASSES
Anti-Erosive Role of Natural Plants in Low Foot-Hills Bordering the Ferghana Basin, (In Russian),
W74-04287 4D

GRASSES (BUNCH-FORMING)
Structure and Productivity of the Phytomass of Gigantic Bunch-Forming Grasses in the Amu Darya Floodplain, (In Russian),
W74-04282 2I

GRASSLANDS
An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

GRAVEL PACKS
Application of Engineering to Well Construction and Development at Vernon,
W74-04167 8B

GRAVITATIONAL WATER
The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

GRAVITY WAVES
Wave Shoaling,
W74-04215 2E

GREAT LAKES
Development of Three-Dimensional Numerical Models of the Great Lakes,
W74-04051 2H

GREAT MIAMI RIVER (OHIO)
Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

GREENHOUSES
Simulation of the Energy Balance of a Greenhouse,
W74-04126 2I

GROSS NATIONAL PRODUCT
Accounting for Pollution: Pollution Abatement and the National Product,
W74-03959 5G

The Environmental Cost of Economic Growth,
W74-04088 5G

GROUNDWATER
Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

Cost Analysis of Groundwater Supplies in the North Atlantic Region, 1970,
W74-03815 4B

Dewatering of the Clayton Formation During Construction of the Walter F. George Lock and Dam, Fort Gaines, Clay County, Georgia,
W74-03819 4B

Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

The Ground-Water Depletion Allowance Under the Federal Income Tax,
W74-03962 6E

Effects on Water Quality in the Shallow Aquifer due to the Operation of the Cross State Dump, Palm Beach County, Florida,
W74-04052 5B

The 'Tenacious' Iron Bacteria,
W74-04143 5B

Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

Application of Engineering to Well Construction and Development at Vernon,
W74-04167 8B

Changes in Statistical Processing of Groundwater Level Measurements (Wandlungen bei der statistischen Aufbereitung von Grundwasserstandsmesswerten),
W74-04247 2F

Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California),
W74-04274 7C

GROUNDWATER MOVEMENT
The Hydraulics of Artificial Recharge,
W74-03820 4B

The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

Evaluation of Groundwater Resources in Livermore Valley, California,
W74-04201 2F

The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

GROUNDWATER RECHARGE
The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

GROUNDWATER RESOURCES
Water Resources of the New Jersey Part of the Ramapo River Basin,
W74-03806 4B

Water-Level Declines and Ground-Water Quality, Upper Black Squirrel Creek Basin, Colorado,
W74-03808 4B

Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

Water Availability in Mobile County, Alabama,
W74-03811 4B

Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

Effects of the Feeder Canal on the Water Resources of the Fort Lauderdale Prospect Well-Field Area,
W74-04259 5G

GROUTING
Well Grouting and Well Protection,
W74-04164 8F

GROWTH
Age Structure and Growth of Fish in Waters of Northern Tadzhikistan, (In Russian),
W74-04071 8I

Dependence of the Growth of White Bream and Goldfish on Environment, (In Byelorussiau),
W74-04090 2H

GROWTH RATES
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

Temperature and Phytoplankton Growth in the Sea,
W74-04233 5C

GRUMUSOL
Gypsum as Improver of the Permeability of Grumusol (Typic Pellustert) in the Kano Plains of Kenya,
W74-04193 2G

GULF OF CORINTH
Some Physical and Chemical Properties of the Gulf of Corinth,
W74-04273 2L

GULF OF MEXICO
Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

GYPSUM
Gypsum as Improver of the Permeability of Grumusol (Typic Pellustert) in the Kano Plains of Kenya,
W74-04193 2G

HARBORS
Port, Harbor and Terminal Districts; Powers and Duties; Bonds.
W74-03982 6E

Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

HARVEST
Harvest Qualities of Various Sizes of Hard Winter Wheat Seeds Under Irrigated Conditions in the Southern Steppes of the Ukraine, (In Russian),
W74-03915 3F

HARVESTING OF ALGAE
Intensive Outdoor Culture of Marine Phytoplankton Enriched with Treated Sewage Effluent,
W74-04103 5D

HAZARDOUS CHEMICALS
Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

HAZARDOUS MATERIALS SPILLS
Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

HEAT
Division of the Cisbaykal Region into Zones on the Basis of Moisture and Heat Availability (Rayonirovaniye territorii Predbaykal'ya po stepeni uvlazhneniya i teploobespechennosti),
W74-04254 2G

HEAT TRANSFER
Mechanics of Heat Transfer in Nonstratified Open-Channel Flows,
W74-03792 5B

An Improved Mixing Length Theory of Turbulent Heat and Mass Transfer,
W74-04231 8B

Temperature Profiles for Turbulent Flow of High Prandtl Number Fluids,
W74-04232 8B

Thermal Interaction of two Streams in Boundary-Layer Flow Separated by a Plate,
W74-04236 8B

Transient Heat and Mass Transfer in Fully Developed Laminar Tube Flows,
W74-04237 8B

HEATED WATER
The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

Thermal Pollution and its Control,
W74-04234 5B

HEATING
Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

HEAVY METALS
Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

Mercury: Uptake by the Goldfish, Carassius auratus, from Low Concentrations in Water and Its Tissue Distribution,
W74-03898 5C

Application of the Carbon Cup Atomisation Technique in Water Analysis by Atomic-Absorption Spectroscopy,
W74-04073 5A

HELICAL WAVES
Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

HELMINTHOSPORIUM-TURCICUM
Effect of Weather Conditions on Sporulation of Helminothosporium turcicum Pass,
W74-04296 3F

HEMP
Changes in Vessel Diameter in Two Species of Herbaceous Plants, (In Russian),
W74-04280 2I

HERBACEOUS PLANTS
Changes in Vessel Diameter in Two Species of Herbaceous Plants, (In Russian),
W74-04280 2I

HERBICIDES
Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

Weed Control in Sugar Beet Crops in the Kosovo Region, (In Serbo-Croatian),
W74-03943 3F

Hygienic Evaluation of a Machine for Applying Granulated Herbicides in Canals of the Collector-Drainage Network, (In Russian),
W74-04166 5G

HERBIVORES
An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

HEURISTIC ALGORITHM
Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

HORIZONTAL PERMEABILITY
New Single-Well Test for Determining Vertical Permeability,
W74-04150 8G

HOT SPRINGS
On Saltwater Hot Springs in the Coast Area of Western Anatolia, Turkey (Uber Salzwasser-Thermen Im Kustenland Von West-Anatolien, Turkei),
W74-04270 2F

HOUSATONIC RIVER BASIN (MASS)
Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

HUDSON RIVER
A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

HUMAN DISEASES
Occupationally Related Health Hazards in Wastewater Treatment Systems,
W74-03853 5C

HUMIC ACIDS
Determining the Cation Capacity of Humic Substances Using Flame Photometry, (In Estonian),
W74-04298 5A

Determination of Cation Capacity of Humic Acids by Thin Ash Content, (In Estonian),
W74-04299 5A

HYDRAULIC CONDUCTIVITY
An Experimental Study of Soil Water Flow Systems Involving Hysteresis,
W74-03760 2G

HYDRAULIC DESIGN
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

HYDRAULIC EQUIPMENT
Operation and Maintenance of Centrifugal Pumps,
W74-04146 8C

Remote Control is Coming,
W74-04153 8C

HYDRAULIC EQUIVALENCE
Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

HYDRAULIC MACHINERY
Better Pump Installation,
W74-04154 8C

HYDRAULIC MODELS
The Rhein Study,
W74-03788 2J

Flume Experiments on the Transition from Ripples to Lower Flat Bed with Increasing Sand Size,
W74-04063 2J

HYDRAULIC SIMILITUDE
Uncertainties in Hydrologic Models,
W74-03916 2A

HYDRAULIC VALVES-BUTTERFLY VALVES
Discharge System for the A.D. Edmonston Pumping Plant,
W74-04038 3B

HYDRAULICS
Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

Temperature Profiles for Turbulent Flow of High Prandtl Number Fluids,
W74-04232 8B

HYDROBIOLOGICAL STUDIES
The Diatomaceous Populations in the Basin of the Meurthe River: Attempt at an Hydrobiological Synthesis, (In French),
W74-04288 2I

Hydrobiological Studies of 2 Shallow Ponds: Observations on Temperature and Plankton Distribution and the Influence of a Plant Cover Containing Lemna minor, (In French),
W74-04291 2H

HYDROBIOLOGY
Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

HYDRODYNAMICS
The Structural-Continuum Theory of Dilute Suspensions of Rigid Ellipsoidal Particles,
W74-04249 8B

HYDROGEN ION CONCENTRATION
The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

Stability Field Diagrams as Aids in Iron Chemistry Studies,
W74-04163 2K

HYDROGEOLOGY
Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

HYDROLOGIC CYCLE
Water Quality Cycle--Reflection of Activities of Nature and Man,
W74-04263 5B

HYDROLOGIC DATA
Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

Annual Compilation and Analysis of Hydrologic Data for Elm Fork Trinity River, Trinity River Basin, Texas, 1971,
W74-03818 2E

Application of Statistical Methods in Hydrology (Primeneniye statisticheskikh metodov v gidrologii).
W74-03831 6B

A General Procedure for Consumption-Density Studies,
W74-04040 6D

Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

HYDROLOGY
Problems in Mathematical Modeling of Hydrologic Processes (Voprosy matematicheskogo modelirovaniya gidrologicheskikh protsessov).
W74-03830 2A

Application of Statistical Methods in Hydrology (Primeneniye statisticheskikh metodov v gidrologii).
W74-03831 6B

HYDROLYSIS
The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

The Influence of Suspended Particles on the Precipitation of Iron in Natural Waters,
W74-04272 5B

HYGIENIC EVALUATION
Hygienic Evaluation of a Machine for Applying Granulated Herbicides in Canals of the Collector-Drainage Network, (In Russian),
W74-04166 5G

HYGROMETRY
Evaluation of Water Flux Above a Deep Water Table Using Thermocouple Psychrometers,
W74-03776 2G

HYPOCHLORITES
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

HYSTERESIS
An Experimental Study of Soil Water Flow Systems Involving Hysteresis,
W74-03760 2G

ICE
The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

IDAHO
Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

ILLINOIS
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

Water Pollution.
W74-03972 6E

Canals and Waterways.
W74-03990 6E

Flood Damage Prevention-Construction of Buildings,
W74-03992 6E

Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

IMPERIAL VALLEY (CALIF)
Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

IMPLIED BENEFITS
An Evaluation of Urban Flood Plains,
W74-03756 6F

IMPOUNDED WATERS
Ohio v. Callaway (Injunction Action for Failure to Comply with Nepa).
W74-04009 6E

INCOME ANALYSIS
Regional Interdependencies and External Diseconomies,
W74-03912 6B

INCOME DISTRIBUTION
Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

INCOME DISTRIBUTIONS
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

INCUBATION
Temperature-Gradient Incubator for the Growth of Clostridia,
W74-03878 5A

INDIA
Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

INDIAN CORN
Arizona Indian Corn (Zea mays L.),
W74-03926 3F

INDIAN RESERVATIONS
Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

INDIANA
Study of Water Resources and Management.
W74-03970 6E

General Powers of Cities and Towns--Streets, Alleys, Water-courses, Sewers--Control.
W74-03971 6E

Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

INDIRECT BENEFITS
Externalities, Shadow Prices, and Benefit-Cost Calculations,
W74-03960 6B

INDIRECT COSTS
Externalities, Environmental Pollution and Allocation in Space: A General Equilibrium Approach,
W74-04084 5G

INDUSTRIAL ORGANIZATION
The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part II. Structure of the Industry.
W74-04082 5G

INDUSTRIAL POLLUTION INDEX
An Industrial Pollution Index,
W74-03889 5G

INDUSTRIAL WASTES
The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

Treatment of Oily and Metal-Containing Wastewater,
W74-03852 5B

In-Plant Biological Monitoring,
W74-03855 5A

An Industrial Pollution Index,
W74-03889 5G

United States v. United States Steel (Refuse Act Violation).
W74-04011 6E

Industrial Water Pollution Control--An Overview,
W74-04028 5D

INDUSTRIAL WATER
The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

INDUSTRIES
The Economic Impact of Pollution Control. An Overview, a Summary of Research Studies.
W74-04077 5G

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part I. Introduction and Executive Summary.
W74-04081 5G

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part II. Structure of the Industry.
W74-04082 5G

INFILTRATION
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

INFILTROMETERS
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

INFRARED SPECTROPHOTOMETRY
Identifying Source of Petroleum by Infrared Spectroscopy,
W74-03854 5A

Simultaneous Determination of Ferrocyanide and Ferricyanide in Aqueous Solutions Using Infrared Spectrometry,
W74-03866 5A

INHIBITION
Corrosion and its Prevention in Waters,
W74-04151 8G

Synergistic Inhibition of Ferric Ion Corrosion During Chemical Cleaning of Metal Surfaces,
W74-04169 8G

INHIBITORS
Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

INJECTION WELLS
Borehole Recharge: The Compatability of Recharge Water With the Aquifer,
W74-03822 4B

Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

Clogging in Recharge Wells, Causes and Cures,
W74-03824 4B

The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

Wat's New in Deep-Well Injection,
W74-04265 5E

INJUNCTION
Friends of the Earth v. Armstrong (Environmental Protection Suit).
W74-04007 6E

INSTITUTIONS
Interstate Compacts and Regional Water Resources Planning and Management,
W74-04000 6E

INSTRUMENTATION
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

Water-Sediment Splitter for Runoff Samples Containing Coarse-Grained Sediment,
W74-03780 2J

Instrumental Parameters for Determination of Mercury by Flameless Atomic Absorption Spectrophotometry,
W74-03844 5A

Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXI. Introduction and Instrumentation,
W74-03859 5A

Piezoelectric Pressure Transducers.
W74-03870 7B

The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

INTERAGENCY COOPERATION
Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

INTERGRANULAR CORROSION
Corrosion and Corrosion Control,
W74-04161 8G

INTERNAL WAVES
'Internal Waves' Advancing Along Submarine Canyons,
W74-04261 2E

INTERNATIONAL LAW
A Harbinger: The Senkaku Islands.
W74-04023 6E

High Seas Intervention: Parameters of Unilateral Action,
W74-04031 6E

The Ocean Dumping Convention--A Hopeful Beginning,
W74-04032 5G

INTERNATIONAL WATERS
Jurisdictional Problems Created by Artificial Islands.
W74-04022 6E

A Harbinger: The Senkaku Islands.
W74-04023 6E

INTERSTATE COMMISSIONS
The Potomac, Water Quality Planning.
W74-03977 5G

Interstate Compacts and Regional Water Resources Planning and Management,
W74-04000 6E

INTERSTATE COMPACTS
Interstate Compacts and Regional Water Resources Planning and Management,
W74-04000 6E

INTERVENTION
High Seas Intervention: Parameters of Unilateral Action,
W74-04031 6E

INUNDATION
The Inundation Region of the Danube, Km 1402,
W74-04080 2K

INVERTEBRATES
A Comparison of Invertebrate Drift in Three Michigan Streams,
W74-03902 5B

Benthic Macroinvertebrate Diversity in Three Differentially Perturbed Michigan Streams,
W74-03905 5C

INVESTMENT DECISION MODEL
An Investment Decision Model for Control Technology,
W74-04079 5G

ION EXCHANGE
Cation Adsorption and Desorption Rates in Natural Water Studies,
W74-03765 5A

Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments,
W74-04268 2K

ION SELECTIVE ELECTRODES
Cation Adsorption and Desorption Rates in Natural Water Studies,
W74-03765 5A

Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXI. Introduction and Instrumentation,
W74-03859 5A

A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

IOWA
Floods in Iowa: Technical Manual for Estimating Their Magnitude and Frequency,
W74-03805 4A

Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

Iowa Water Pollution Control Commission V. Town of Paton (Authority to Compel Town to Change its Sewage System).
W74-03985 6E

IRON
Iron Ore in Lakes of Vologda Oblast (Zhelezorudnyye ozera Vologodskoy oblasti),
W74-03833 2H

Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

Stability Field Diagrams as Aids in Iron Chemistry Studies,
W74-04163 2K

The Influence of Suspended Particles on the Precipitation of Iron in Natural Waters,
W74-04272 5B

IRON BACTERIA
The 'Tenacious' Iron Bacteria,
W74-04143 5B

Investigation of the Microflora of Swamp Ore and Lake Water by the Method of Electron Microscopy, (In Russian),
W74-04292 5A

IRON COMPOUNDS
Iron Ore in Lakes of Vologda Oblast (Zhelezorudnyye ozera Vologodskoy oblasti),
W74-03833 2H

IRON ORE
Iron Ore in Lakes of Vologda Oblast (Zhelezorudnyye ozera Vologodskoy oblasti),
W74-03833 2H

IRON OXIDES
Iron Ore in Lakes of Vologda Oblast (Zhelezorudnyye ozera Vologodskoy oblasti),
W74-03833 2H

IRRIGABLE LANDS
West Side Crop Adaptability Study.
W74-03922 3F

IRRIGATION
Agricultural Impact on Water Quality in Western Rivers,
W74-03796 5B

Water Renovation for Unrestricted Re-Use,
W74-04034 5D

The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

IRRIGATION CANALS
Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

IRRIGATION EFFECTS
Irrigated Recreational Turfgrass with Sewage Effluent,
W74-03929 3C

Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

IRRIGATION EFFICIENCIES
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

IRRIGATION EFFICIENCY
Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

Grain Sorghum Response to Trickle and Subserface Irrigation,
W74-04137 3F

IRRIGATION ENGINEERING
Semi-Portable Sheet Metal Flume for Automated Irrigation,
W74-04138 3F

IRRIGATION PRACTICES
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

Alfalfa Quality: Is There a Difference,
W74-03930 3F

Some Data on the Water Economy and the Utilization of Water Resources in Bulgaria, Including Irrigation,
W74-03954 3F

Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

Semi-Portable Sheet Metal Flume for Automated Irrigation,
W74-04138 3F

IRRIGATION SYSTEMS
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

Semi-Portable Sheet Metal Flume for Automated Irrigation,
W74-04138 3F

IRRIGATION WATER
Petrus V. Arkansas Irrigation Co. (Injunction to Prevent Interference with Flowage Rights).
W74-03994 6E

ISLANDS
Port of Portland V. an Island in Columbia River (Action to Quiet Title to Alluvial Island in Columbia River).
W74-03987 6E

ISOLATION
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

Phenotypic Variability of the Envelope Proteins of Klebsiella aerogenes,
W74-03882 5C

ISRAEL (LAKE KINNERET)
Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

ITALY
Environmental Radioactivity - Ispra 1971,
W74-04176 5B

ITALY (LAKE MONATE)
Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

JAMES RIVER (VA
The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

JETS
Laminar and Axisymmetric Vertical Jets in a Stably Stratified Environment,
W74-04224 8B

JUDICIAL DECISION
Schwermann v. Reinhart (Drainage Ditch Construction in Wildlife Conservation Area).
W74-03997 6E

Czarnick v. Loup River Public Power District (Liability of Power District for Damage Resulting From Negligence).
W74-04021 6E

JUDICIAL DECISIONS
Commonwealth V. Harmar Coal Co. (Denial of Mine Drainage Permits).
W74-03984 6E

Iowa Water Pollution Control Commission V. Town of Paton (Authority to Compel Town to Change its Sewage System).
W74-03985 6E

Port of Portland V. an Island in Columbia River (Action to Quiet Title to Alluvial Island in Columbia River).
W74-03987 6E

Village of Cornwall v. Environmental Protection Administration of the City of New York (Approval Sought for Interconnection with Aqueduct).
W74-03995 5G

Hillsbourgh County Environmental Protection Commission v. Frandorson Properties (Deliberate Destruction of Mangroves in Tidal Waters Not Forbidden).
W74-03996 6E

Friends of the Earth v. Armstrong (Environmental Protection Suit).
W74-04007 6E

United States v. Tobin Packing Co. (Violation of Rivers and Harbors Act).
W74-04008 6E

KANYA
A New Approach to Domestic Water Rating,
W74-03963 6C

KAOLINITE
The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

KARST HYDROLOGY
Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

KENTUCKY
Kentucky Pollution Abatement Authority.
W74-04002 6E

Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

KENYA (KANO PLAINS)
Gypsum as Improver of the Permeability of Grumusol (Typic Pellustert) in the Kano Plains of Kenya,
W74-04193 2G

KINETICS
Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

KLEBSIELLA AEROGENES
Phenotypic Variability of the Envelope Proteins of Klebsiella aerogenes,
W74-03882 5C

LABORATORY TESTS
Loss of Mercury from Water During Storage,
W74-04048 5A

Gelatin Coated Microscope Slides in Sedimentary Size Analysis,
W74-04055 2J

Measuring Volumes of Sedimentary Grains,
W74-04056 2J

LAKE BASINS
Lakes of the Bol'shoy Patok River Basin (Northern Urals). Their Importance and Preservation (Ozera basseyna r. Bol'shoy Patok (Pripolyarnyy Ural), ikh znacheniye i okhrana).,
W74-03832 2H

LAKE BEDS
Montezuma Well, Arizona, as a Habitat,
W74-03925 2H

LAKE BOTTOM SPRINGS
Montezuma Well, Arizona, as a Habitat,
W74-03925 2H

LAKE CAYUGA (NY)
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

LAKE ERIE
An Ecological Evaluation of a Thermal Discharge. Part II: The Distribution of Phytoplankton and Primary Productivity Near the Western Shore of Lake Erie,
W74-03936 5C

LAKE FLUSHING
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

LAKE GOLCUK (TURKEY)
Preliminary Survey of Golcuk, A Eutrophic Mountain Lake in Western Turkey,
W74-03946 5C

LAKE KINNERET (ISRAEL)
Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

LAKE MICHIGAN
Assault on a Lake,
W74-03975 5G

Aerial Radiological Measuring Survey of the Area Surrounding Big Rock Point Nuclear Plant, Big Rock Point, Michigan, 1968,
W74-04186 5B

A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

LAKE MORPHOMETRY
Lakes of the Bol'shoy Patok River Basin (Northern Urals). Their Importance and Preservation (Ozera basseyna r. Bol'shoy Patok (Pripolyarnyy Ural), ikh znacheniye i okhrana).,
W74-03832 2H

LAKE NORRVIKEN (SWEDEN)
A Programme for Studies of the Recovery of Polluted Lakes. The Effect of Chemical Sewage Treatment and Diversion of Sewage,
W74-04105 5C

LAKE PAWTUCKAWAY (NH)
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

LAKE RENEWAL
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

LAKE SEDIMENTS
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

Montezuma Well, Arizona, as a Habitat,
W74-03925 2H

Exchangeable Cations in Soils of the Dnieper Reservoirs,
W74-04255 2H

LAKE TAHOE (NEV)
A Reconnaissance of Streamflow and Fluvial Sediment Transport, Incline Village Area, Lake Tahoe, Nevada, Second Progress Report 1971,
W74-04050 2J

LAKE TROUT
Potamological Effects of Fish Hatchery Discharge on the Jordan River, Northern Lower Michigan,
W74-03903 5C

LAKES
Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

Lakes of the Bol'shoy Patok River Basin (Northern Urals). Their Importance and Preservation (Ozera basseyna r. Bol'shoy Patok (Pripolyarnyy Ural), ikh znacheniye i okhrana).,
W74-03832 2H

Iron Ore in Lakes of Vologda Oblast (Zhelezorudnyye ozera Vologodskoy oblasti),
W74-03833 2H

Preliminary Survey of Golcuk, A Eutrophic Mountain Lake in Western Turkey,
W74-03946 5C

A Reconnaissance of Streamflow and Fluvial Sediment Transport, Incline Village Area, Lake Tahoe, Nevada, Second Progress Report 1971,
W74-04050 2J

A Programme for Studies of the Recovery of Polluted Lakes. The Effect of Chemical Sewage Treatment and Diversion of Sewage,
W74-04105 5C

Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

LAMINAR FLOW
Transient Heat and Mass Transfer in Fully Developed Laminar Tube Flows,
W74-04237 8B

LAMINAR JETS
Laminar and Axisymmetric Vertical Jets in a Stably Stratified Environment,
W74-04224 8B

LAND DEVELOPMENT
Flood Profiles in the Umpqua River Basin, Oregon, Part 2,
W74-03803 4A

LAND USE
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

An Evaluation of Urban Flood Plains,
W74-03756 6F

Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience,
W74-03965 6B

Planning and Zoning-Land Subdivisions,
W74-04006 6E

LANDFILLS
United States v. Cannon (Injunction Against Violation of Rivers and Harbors Act),
W74-04010 6E

LARVAE
Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

LATENT HEAT
A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

LATERAL CONVEYANCE STRUCTURES
Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

LAW ENFORCEMENT
Water Pollution,
W74-03972 6E

LAW OF THE SEA
Jurisdictional Problems Created by Artificial Islands.
W74-04022 6E

A Harbinger: The Senkaku Islands.
W74-04023 6E

High Seas Intervention: Parameters of Unilateral Action,
W74-04031 6E

The Ocean Dumping Convention--A Hopeful Beginning,
W74-04032 5G

LEACHING
Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

LEAKAGE
Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

Cathodic Protection in Congested Areas,
W74-04159 8G

LEASES
Leasing of Areas for Cultivation of Marine Resources.
W74-03993 6E

LEAVES
Leaf Orientation of a Cotton Plant,
W74-04132 3F

Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

Increasing the Processing Rate of Particulate Organic Matter in Streams,
W74-04202 5B

LEGAL ASPECTS
Petterson V. Froehlke (Challenge to Dredging Permit Issued by Corps of Engineers).
W74-03983 6E

Petrus V. Arkansas Irrigation Co. (Injunction to Prevent Interference with Flowage Rights).
W74-03994 6E

High Seas Intervention: Parameters of Unilateral Action,
W74-04031 6E

Developments in Water Utility Law, 1972-1973, American Bar Association Review.
W74-04037 5G

Paasch V. Brown (Damages From Obstruction of Water Flow by Lower Landowner).
W74-04039 6E

LEGAL REVIEW
The Future of Water Quality Control,
W74-04026 5G

LEGISLATION
Study of Water Resources and Management.
W74-03970 6E

General Powers of Cities and Towns--Streets, Alleys, Water-courses, Sewers--Control.
W74-03971 6E

Water Pollution.
W74-03972 6E

Shore Erosion Control.
W74-03974 6E

A Bill Authorizing the Secretary of the Army to Construct Floodwater Channels.
W74-03981 6E

Petterson V. Froehlke (Challenge to Dredging Permit Issued by Corps of Engineers).
W74-03983 6E

A Bill to Authorize Extensions of the American Canal at El Paso, Texas.
W74-03986 6E

Canals and Waterways.
W74-03990 6E

Soil Conservation Districts.
W74-03998 6E

Department of Natural Resources--Water Resource.
W74-04005 6E

Planning and Zoning-Land Subdivisions.
W74-04006 6E

Water Pollution Control.
W74-04015 6E

Conservation--Regulation of Streamflow.
W74-04016 6E

Supervision of Oil, Gas, and Natural Dry Gas Wells.
W74-04018 6E

Florida Water Resources Act of 1972.
W74-04019 6A

Eminent Domain.
W74-04020 6E

Offenses Concerning Public Roads and Navigable Waters.
W74-04029 6E

Safe Drinking Water Act of 1972--S.3994.
W74-04030 5G

Developments in Water Utility Law, 1972-1973, American Bar Association Review.
W74-04037 5G

LEGUME PLOTS
Accumulation of Root Mass in Perennial Legume Plots on Eroded Soils (In Azerbaidzhan),
W74-03874 3F

LEMNA-MINOR
Hydrobiological Studies of 2 Shallow Ponds: Observations on Temperature and Plankton Distribution and the Influence of a Plant Cover Containing Lemna minor, (In French),
W74-04291 2H

LEPTODORA-KINDTII
Diet of the Mesocyclops leuckarti (Claus) and Leptodora kindtii (Focke) Populations in Lake Ilmen, (In Russian),
W74-04091 2H

LETHAL LIMIT
Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

The Effect of Changes in Ambient Temperature on Spontaneous Activity in Skipjack Tuna,
W74-04241 5C

LIGHTHOUSES
Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

LIMESTONES
Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

LIMITING FACTORS
Causes and Control of Algal Blooms in Spiritwood Lake, North Dakota,
W74-03906 5C

LIMNOLOGY
Iron Ore in Lakes of Vologda Oblast (Zhelezorudnyye ozera Vologodskoy oblasti),
W74-03833 2H

Preliminary Survey of Golcuk, A Eutrophic Mountain Lake in Western Turkey,
W74-03946 5C

LINEAR PROGRAMMING
Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

LITORIA GRACILENTA
Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

LITTER
Littering of Property and Waters.
W74-04017 6E

Increasing the Processing Rate of Particulate Organic Matter in Streams,
W74-04202 5B

LITTORAL
Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

LITTORAL DRIFT
A Comparison of Invertebrate Drift in Three Michigan Streams,
W74-03902 5B

Modern Sediments of Willapa Bay, Washington: A Coastal Plain Estuary,
W74-04209 2L

LIVER (FISH)
Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

LOCKS
Temporary Navigation Lock (Modification of Lock and Dam 53) (Final Environmental Impact Statement), Ohio River, Illinois and Kentucky.
W74-03966 8A

LONGSHORE CURRENTS
On Wind Tides and Longshore Currents Over the Continental Shelf Due to Winds Blowing at an Angle to the Coast,
W74-04210 2E

Theoretical Study of Longshore Currents on a Plane Beach,
W74-04214 2E

LONGSHORE TRANSPORT
Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

LOUISIANA
Port, Harbor and Terminal Districts; Powers and Duties; Bonds.
W74-03982 6E

MAINE
Portland Pipe Line Corporation V. Environmental Improvement Commission (Constitutionality of a State Statute).
W74-03988 6E

Leasing of Areas for Cultivation of Marine Resources.
W74-03993 6E

Planning and Zoning-Land Subdivisions.
W74-04006 6E

MAMMALS
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

MANAGEMENT
Alaska Water Resources Research Needs for the 70's.
W74-03757 6B

Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

MANGANESE
A Solvent-Extraction Method for the Determination of Manganese-54 in Sea Water,
W74-03886 5A

MANGANESE OXIDES
The Effectiveness of Sand Filters for the Removal of Colloidal Manganese Oxides from Water Using Selected Cations as Filter Aids,
W74-03893 5F

MANGROVE SWAMPS
Hillsbourgh County Environmental Protection Commission v. Frandorson Properties (Deliberate Destruction of Mangroves in Tidal Waters Not Forbidden).
W74-03996 6E

MAPPING
Appreciation of the Fitness for Utilization of the Soils of Provence,
W74-04125 2G

Aerial Radiological Measuring Survey of the Area Surrounding the Monticello Nuclear Generating Plant, Monticello, Minnesota, August 1970.
W74-04185 5B

Aerial Radiological Measuring Survey of the Area Surrounding Big Rock Point Nuclear Plant, Big Rock Point, Michigan, 1968,
W74-04186 5B

A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California),
W74-04274 7C

MAPS
Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

A Map of Annual River Runoff in the Pamirs and Pamir-Alay Mountains (Karta godovogo stoka rek Pamira i Pamiro-Alaya),
W74-03836 2E

Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

MARINE ALGAE
North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

Intensive Outdoor Culture of Marine Phytoplankton Enriched with Treated Sewage Effluent,
W74-04103 5D

MARINE ANIMALS
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

MARINE BIOLOGY
Monterey Bay Bibliography.
W74-04218 2L

Monterey Bay Bibliography. Supplement Number One.
W74-04219 2L

MARINE FISH
Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

Regulation of Brain and Eye Temperatures by the Bluefin Tuna,
W74-04239 5C

The Effect of Changes in Ambient Temperature on Spontaneous Activity in Skipjack Tuna,
W74-04241 5C

MARINE FISHERIES
Fisherman Quotas: A Tentative Suggestion for Domestic Management,
W74-03991 6E

Leasing of Areas for Cultivation of Marine Resources.
W74-03993 6E

MARINE GEOLOGY
Monterey Bay Bibliography.
W74-04218 2L

Monterey Bay Bibliography. Supplement Number One.
W74-04219 2L

MARINE MICROORGANISMS
Temperature and Phytoplankton Growth in the Sea,
W74-04233 5C

MARKOV PROCESSES
Evaluation of Groundwater Resources in Livermore Valley, California,
W74-04201 2F

MARSHES
Schwermann v. Reinhart (Drainage Ditch Construction in Wildlife Conservation Area).
W74-03997 6E

MARYLAND
Shore Erosion Control.
W74-03974 6E

MASS TRANSFER
Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

An Improved Mixing Length Theory of Turbulent Heat and Mass Transfer,
W74-04231 8B

Temperature Profiles for Turbulent Flow of High Prandtl Number Fluids,
W74-04232 8B

Thermal Interaction of two Streams in Boundary-Layer Flow Separated by a Plate,
W74-04236 8B

Transient Heat and Mass Transfer in Fully Developed Laminar Tube Flows,
W74-04237 8B

MASSACHUSETTS
Internal Geometry and Origin of Vegetated Coastal Sand Dunes,
W74-04061 2J

Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

Effects of Deicing Chemicals Upon Ground and Surface Waters (Initial Program Development),
W74-04149 5B

Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

MATHEMATICAL MODELS
Problems in Mathematical Modeling of Hydrologic Processes (Voprosy matematicheskogo modelirovaniya gidrologicheskikh protsessov).
W74-03830 2A

Problems in Phenolics-Modeling Methods in the Ohio River at Wheeling, W. Va.,
W74-03849 5A

The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

Effect of Moisture Stress Upon Maize Production and Its Economic Significance,
W74-03948 3F

An Investment Decision Model for Control Technology,
W74-04079 5G

A Study of a Generalized Mathematical Model 'Predator-Sacrifice,' (In Russian),
W74-04092 2I

Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

Effects of Deicing Chemicals Upon Ground and Surface Waters (Initial Program Development),
W74-04149 5B

Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

MATHEMATICAL STUDIES
A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

MEASUREMENT
An Experimental Study of Soil Water Flow Systems Involving Hysteresis,
W74-03760 2G

Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

Summary Report of the Agreed Monitoring Projects on Eutrophication of Waters.
W74-03940 5C

Accounting for Pollution: Pollution Abatement and the National Product,
W74-03959 5G

Nuclear Spin-Lattice Relaxation of Liquids Confined in Porous Solids,
W74-04157 2F

Comparison of Measured and Calculated Radiation Exposure from a Boiling Water Reactor Plume,
W74-04175 5B

Environmental Applications of Advanced Instrumental Analyses: Assistance Projects, FY 72,
W74-04197 5A

Explicit Calibration of the PILLS II System,
W74-04198 5D

MEASUREMENT ACCURACY
Integrated Measurement of Soil Moisture by Use of Radio Waves,
W74-03772 2C

MEDITERRANEAN SEA
Basic Types of Recent Bottom Sediments of the Mediterranean Sea, Their Mineralogy and Geochemistry (Osnovnyye tipy sovremennykh donnykh osadkov Sredizemnogo morya, ikh mineralogiya i geokhimiya),
W74-03828 2J

MEMBRANE PROCESSES
Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

MEMBRANES
Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses,
W74-04127 3F

MERCURIALS
A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

MERCURY
The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

Instrumental Parameters for Determination of Mercury by Flameless Atomic Absorption Spectrophotometry,
W74-03844 5A

Improvements in the Wet Oxidation-Dithizone Method for Determining Low Mercury Levels in Food,
W74-03869 5A

Mercury: Uptake by the Goldfish, Carassius auratus, from Low Concentrations in Water and Its Tissue Distribution,
W74-03898 5C

A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

Catastrophe Brewing in Quiet Waters,
W74-04025 5B

Loss of Mercury from Water During Storage,
W74-04048 5A

MERCURY LOSS FROM WATER SAMPLES
Loss of Mercury from Water During Storage,
W74-04048 5A

MEROMIXIS
A Meromictic Lake in Australia,
W74-04101 5C

MESOCYCLOPS-LEUCKARTI
Diet of the Mesocyclops leuckarti (Claus) and Leptodora kindtii (Focke) Populations in Lake Ilmen, (In Russian),
W74-04091 2H

METAL WASTES
Treatment of Oily and Metal-Containing Wastewater,
W74-03852 5B

METALS
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

METEOROLOGICAL CONDITION
Some Causes of Failure in the Closeness of Correlative Connection Between Tree Species Transpiration and Meteorological Factors, (In Russian),
W74-04283 2D

METEOROLOGICAL DATA
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

METHODOLOGY
Test for Anticholinesterase Materials in Water,
W74-03838 5A

Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

A Solvent-Extraction Method for the Determination of Manganese-54 in Sea Water,
W74-03886 5A

Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

METHYLMERCURY
Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

MEXICO
A Bill to Authorize Extensions of the American Canal at El Paso, Texas.
W74-03986 6E

MICHIGAN
The Characterization and Influence of Domestic Drain Effluents on the Red Cedar River,
W74-03895 5B

A Comparison of Invertebrate Drift in Three Michigan Streams,
W74-03902 5B

Potamological Effects of Fish Hatchery Discharge on the Jordan River, Northern Lower Michigan,
W74-03903 5C

Benthic Macroinvertebrate Diversity in Three Differentially Perturbed Michigan Streams,
W74-03905 5C

Littering of Property and Waters.
W74-04017 6E

Supervision of Oil, Gas, and Natural Dry Gas Wells.
W74-04018 6E

MICROORGANISMS
Microflora of Nutrient Solution in Soilless Growing of Vegetable Crops, (In Russian),
W74-04235 3F

Investigation of the Microflora of Swamp Ore and Lake Water by the Method of Electron Microscopy, (In Russian),
W74-04292 5A

Utilization of Aromatic Compounds by Benthic Microorganisms of a Eutrophic Lake,
W74-04295 5C

MICROSCOPY
Gelatin Coated Microscope Slides in Sedimentary Size Analysis,
W74-04055 2J

MINE DRAINAGE
Commonwealth V. Harmar Coal Co. (Denial of Mine Drainage Permits).
W74-03984 6E

MINERALOGY
Basic Types of Recent Bottom Sediments of the Mediterranean Sea, Their Mineralogy and Geochemistry (Osnovnyye tipy sovremennykh donnykh osadkov Sredizemnogo morya, ikh mineralogiya i geokhimiya),
W74-03828 2J

Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

MINERALS
The Ability of Some Minerals to Adsorb Viruses from Water(In Ukrainian),
W74-03978 5F

MINING
Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

MINNESOTA
Schwermann v. Reinhart (Drainage Ditch Construction in Wildlife Conservation Area).
W74-03997 6E

Aerial Radiological Measuring Survey of the Area Surrounding the Monticello Nuclear Generating Plant, Monticello, Minnesota, August 1970.
W74-04185 5B

MISCIBLE DISPLACEMENT
The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

MISSISSIPPI
Floods of the 1970 and 1971 Water Years in Mississippi,
W74-03816 2E

MISSISSIPPI RIVER BASIN
Species Diversity of Chydorid Fossil Communities in the Mississippi Valley,
W74-03941 5C

Levels of Assessment,
W74-04035 6B

MISSOULA VALLEY (MONT)
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

MITOCHONDRIA
Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses,
W74-04127 3F

MIXING
Natural Mixing Processes in Rivers,
W74-03790 5B

Mechanics of Heat Transfer in Nonstratified Open-Channel Flows,
W74-03792 5B

A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

MN-54
A Solvent-Extraction Method for the Determination of Manganese-54 in Sea Water,
W74-03886 5A

MODEL STUDIES
Problems in Mathematical Modeling of Hydrologic Processes (Voprosy matematicheskogo modelirovaniya gidrologicheskikh protsessov).
W74-03830 2A

Application of Statistical Methods in Hydrology (Primeneniye statisticheskikh metodov v gidrologii).
W74-03831 6B

Mixed Culture Biooxidation of Phenol. II. Steady State Experiments in Continuous Culture,
W74-03880 5C

Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

Residual Information Model with Application to Heat from Thermal Power Plants,
W74-03911 5B

Uncertainties in Hydrologic Models,
W74-03916 2A

The Pollution Sub-System,
W74-03964 6G

Looking for Pollution Under the Earth,
W74-04004 5B

Apparatus for Studies of Artificial Sediments,
W74-04057 2J

Externalities, Environmental Pollution and Allocation in Space: A General Equilibrium Approach,
W74-04084 5G

Simulation of the Energy Balance of a Greenhouse,
W74-04126 2I

MOISTURE
Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2L

Division of the Cisbaykal Region into Zones on the Basis of Moisture and Heat Availability (Rayonirovaniye territorii Predbaykal'ya po stepeni uvlazhneniya i teploobespechennosti),
W74-04254 2G

MOISTURE AVAILABILITY
Fire Climates in the Southwest,
W74-04130 4A

Division of the Cisbaykal Region into Zones on the Basis of Moisture and Heat Availability (Rayonirovaniye territorii Predbaykal'ya po stepeni uvlazhneniya i teploobespechennosti),
W74-04254 2G

MOISTURE DEFICIT
Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

MOISTURE STRESS
Effect of Moisture Stress Upon Maize Production and Its Economic Significance,
W74-03948 3F

Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses,
W74-04127 3F

MOISTURE TENSION
Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

MOLLUSK FAUNA
The Mollusk Fauna of the Bolshoi Karabulak Oxbow Lake (Volga Delta), (In Russian),
W74-04165 2H

MOMENTUM EQUATION
Thermal Interaction of two Streams in Boundary-Layer Flow Separated by a Plate,
W74-04236 8B

MONITORING
Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

In-Plant Biological Monitoring,
W74-03855 5A

Brave New World of TOC and TOD,
W74-03856 5A

The Characterization and Influence of Domestic Drain Effluents on the Red Cedar River,
W74-03895 5B

An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level,
W74-04104 5A

Radio System Monitors Pump Stations,
W74-04148 8G

Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

Environmental Radioactivity - Ispra 1971,
W74-04176 5B

The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

MONOMOY ISLAND (MASS)
Internal Geometry and Origin of Vegetated Coastal Sand Dunes,
W74-04061 2J

MONOSULFONIC ACIDS
Column Partition Chromatographic Determination of Sodium Alkane Monosulfonates,
W74-03867 5A

MONTANA
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

MONTEREY BAY (CA)
Monterey Bay Bibliography.
W74-04218 2L

Monterey Bay Bibliography. Supplement Number One.
W74-04219 2L

MOORS
The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

MORPHOLOGY
Data on the Biology of Alburnus filippii Kessler Living in the Water Reserves of the Armenian SSR, (in Russian),
W74-03953 2I

MOSSES (SUBMERGED)
The Rotifers of the Submerged Mosses and Other Biotopes in the Dammed Regions of the Danube at the German-Austrian Frontier, (In German),
W74-04001 2I

MOUNTAINS
Data of Glaciological Studies. Chronicle and Discussions (Materialy glyatsiologicheskikh issledovaniy. Khronika, Obsuzhdeniya).
W74-03835 2C

A Map of Annual River Runoff in the Pamirs and Pamir-Alay Mountains (Karta godovogo stoka rek Pamira i Pamiro-Alaya),
W74-03836 2E

MUCILAGE
Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

MUD
Filtration Behavior of Circulating Drilling Fluids,
W74-04141 8B

MULCHES
Water Vapor Movement Through Mulches Under Field Conditions,
W74-03784 2G

MUNICIPAL WASTES
Occupationally Related Health Hazards in Wastewater Treatment Systems,
W74-03853 5C

Assault on a Lake,
W74-03975 5G

Iowa Water Pollution Control Commission V. Town of Paton (Authority to Compel Town to Change its Sewage System).
W74-03985 6E

MUSKINGUM RIVER (OHIO)
Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part II: Water Chemistry and Sediment Analyses,
W74-03933 5C

Ohio Mussel Fisheries Investigation. Part III: Plankton Survey,
W74-03934 5C

MUSSELS
Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies,
W74-03932 8I

Ohio Mussel Fisheries Investigation. Part II: Water Chemistry and Sediment Analyses,
W74-03933 5C

NATIONAL ENVIRONMENTAL POLICY ACT
National Water Commission Reports.
W74-03890 6B

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
Ohio v. Callaway (Injunction Action for Failure to Comply with Nepa).
W74-04009 6E

NATIONAL MONUMENTS
Friends of the Earth v. Armstrong (Environmental Protection Suit).
W74-04007 6E

NATIONAL WATER COMMISSION
National Water Commission Reports.
W74-03890 6B

NATURAL GAS
Chemical and Biological Survey of the Savannah River Adjacent to Elba Island,
W74-03804 5B

Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

NATURAL RESOURCES
Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience,
W74-03965 6B

NAVIGABLE WATERS
People V. Mack: A Sportsman's Definition of Navigability,
W74-03967 6E

United States v. United States Steel (Refuse Act Violation).
W74-04011 6E

Offenses Concerning Public Roads and Navigable Waters.
W74-04029 6E

NEAT-CEMENT SLURRY
Well Grouting and Well Protection,
W74-04164 8F

NEBRASKA
Selenium in Nebraska's Groundwater and Streams,
W74-03813 5B

A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

Czarnick v. Loup River Public Power District (Liability of Power District for Damage Resulting From Negligence).
W74-04021 6E

Paasch V. Brown (Damages From Obstruction of Water Flow by Lower Landowner).
W74-04039 6E

NETTLE
Changes in Vessel Diameter in Two Species of Herbaceous Plants, (In Russian),
W74-04280 2I

NEVADA
A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

A Reconnaissance of Streamflow and Fluvial Sediment Transport, Incline Village Area, Lake Tahoe, Nevada, Second Progress Report 1971,
W74-04050 2J

NEW HAMPSHIRE
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

NEW JERSEY
Water Resources of the New Jersey Part of the Ramapo River Basin,
W74-03806 4B

Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

Cleaning up a River,
W74-03968 5G

Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2L

NEW MEXICO
A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

Fire Climates in the Southwest,
W74-04130 4A

NEW YORK
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

Chemical Quality of Surface Water in the Eastern Oswego River Basin, New York,
W74-03817 5A

Water Resources.
W74-03980 6E

Village of Cornwall v. Environmental Protection Administration of the City of New York (Approval Sought for Interconnection with Aqueduct).
W74-03995 5G

A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

NITRATES
Agricultural Impact on Water Quality in Western Rivers,
W74-03796 5B

NITRATES

Nitrate Determination by a Modified Conway Microdiffusion Method,
W74-03845 2G

A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

NITROGEN

Irrigated Recreational Turfgrass with Sewage Effluent,
W74-03929 3C

Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

Nutrient Budgets in Rivers,
W74-03947 5C

Nitrogen and Phosphorus Losses in Surface Runoff from Agricultural Land as Influenced by Placement of Broadcast Fertilizer,
W74-04096 5C

The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

NITROGEN COMPOUNDS

Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

NITROGEN EXCRETION

The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

NONMETROPOLITAN AREA WIDE PLANNING

Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

NORTH CAROLINA

North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

Physical Effects of Maintaining Drainage Channels in North Carolina's Coastal Area,
W74-04075 2E

Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

Coagulation in Estuaries,
W74-04257 5B

NORTHEAST U

Cost Analysis of Groundwater Supplies in the North Atlantic Region, 1970,
W74-03815 4B

NORWAY (NORDMARKA)

Algae from Some Lakes in Nordmarka Near Oslo,
W74-04289 2H

NUCLEAR FUELS

Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

NUCLEAR MAGNETIC RESONANCE

Nuclear Spin-Lattice Relaxation of Liquids Confined in Porous Solids,
W74-04157 2F

NUCLEAR POWERPLANTS

Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

Comparison of Measured and Calculated Radiation Exposure from a Boiling Water Reactor Plume,
W74-04175 5B

Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

The Environmental and Regulatory Aspects of the Breeder Reactor,
W74-04238 5B

The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

NUCLEAR REACTORS

The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

NUCLEAR WASTES

Management of Radioactive Aqueous Wastes from AEC Fuel-Reprocessing Operations,
W74-04188 5B

Environmental Surveillance at Hanford for CY-1970,
W74-04192 5B

NUTRIENT BUDGET

Nutrient Budgets in Rivers,
W74-03947 5C

NUTRIENT REMOVAL

Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

NUTRIENT REQUIREMENTS

Investigations of Nutrition and Metabolism of Catfish and Utilization of Fisheries Products,
W74-03802 8I

NUTRIENTS

Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

Benthic Macroinvertebrate Diversity in Three Differentially Perturbed Michigan Streams,
W74-03905 5C

Nutrient Budgets in Rivers,
W74-03947 5C

OBSTRUCTION TO FLOW

Paasch V. Brown (Damages From Obstruction of Water Flow by Lower Landowner).
W74-04039 6E

OCCUPATIONAL HEALTH

Occupationally Related Health Hazards in Wastewater Treatment Systems.
W74-03853 5C

OCEAN CURRENTS

Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

OCEANOGRAPHY

Some Physical and Chemical Properties of the Gulf of Corinth,
W74-04273 2L

ODOR CONTROL

U-Tube Aeration,
W74-04046 5D

OECD

Summary Report of the Agreed Monitoring Projects on Eutrophication of Waters.
W74-03940 5C

OHIO

Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies,
W74-03932 8I

Ohio Mussel Fisheries Investigation. Part II: Water Chemistry and Sediment Analyses,
W74-03933 5C

Ohio Mussel Fisheries Investigation. Part III: Plankton Survey,
W74-03934 5C

Soil and Water Conservation Commission: Powers of Supervisors.
W74-04003 6E

Ohio v. Callaway (Injunction Action for Failure to Comply with Nepa).
W74-04009 6E

Remote Control is Coming,
W74-04153 8C

Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

OHIO RIVER

Problems in Phenolics-Modeling Methods in the Ohio River at Wheeling, W. Va.,
W74-03849 5A

Temporary Navigation Lock (Modification of Lock and Dam 53) (Final Environmental Impact Statement), Ohio River, Illinois and Kentucky.
W74-03966 8A

Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

OIL
Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

OIL BOOM
Fabric Boom Concept for Containment and Collection of Floating Oil,
W74-04044 5G

OIL FIELDS
Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

OIL INDUSTRY
A Harbinger: The Senkaku Islands.
W74-04023 6E

The Impact of Costs Associated with New Environmental Standards upon the Petroleum Refining Industry. Part II. Structure of the Industry.
W74-04076 3E

OIL POLLUTION
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

Identifying Source of Petroleum by Infrared Spectroscopy,
W74-03854 5A

Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

Pollution of Drinking Water by Oil in the Pipes of New Buildings, (In German),
W74-03950 5B

Portland Pipe Line Corporation V. Environmental Improvement Commission (Constitutionality of a State Statute).
W74-03988 6E

High Seas Intervention: Parameters of Unilateral Action,
W74-04031 6E

Fabric Boom Concept for Containment and Collection of Floating Oil,
W74-04044 5G

OIL SPILLS
The Effects of Artificial Sunlight Upon Floating Oils,
W74-03777 5B

Identifying Source of Petroleum by Infrared Spectroscopy,
W74-03854 5A

Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

Portland Pipe Line Corporation V. Environmental Improvement Commission (Constitutionality of a State Statute).
W74-03988 6E

Disclosure of Unlawful Oil Discharge Provides Immunity from Prosecution,
W74-03989 5G

Fabric Boom Concept for Containment and Collection of Floating Oil,
W74-04044 5G

Aerial Detection of Spill Sources,
W74-04196 5A

OIL WASTES
Treatment of Oily and Metal-Containing Wastewater,
W74-03852 5B

OLIGOTROPHIC LAKES
Primary Production and Destruction of Organic Matter in 2 Lakes of Different Types, (In Russian),
W74-03944 5C

OPEN CHANNEL FLOW
Physical Effects of Maintaining Drainage Channels in North Carolina's Coastal Area,
W74-04075 2E

OPEN CHANNELS
Problems in Mathematical Modeling of Hydrologic Processes (Voprosy matematicheskogo modelirovaniya gidrologicheskikh protsessov).
W74-03830 2A

OPERATION AND MAINTENANCE
Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

OPERATIONS AND MAINTENANCE
Operation and Maintenance of Centrifugal Pumps,
W74-04146 8C

OPTIMIZATION
The Optimal Expansion of a Water Resources Systems,
W74-03754 6A

Sequential Stochastic Optimization for Reservoir System,
W74-03914 4A

Externalities, Shadow Prices, and Benefit-Cost Calculations,
W74-03960 6B

OPTIMUM DEVELOPMENT PLANS
Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

OREGON
Indications of Streambed Degradation in the Willamette Valley,
W74-03770 2J

Flood Profiles in the Umpqua River Basin, Oregon, Part 2,
W74-03803 4A

Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

ORGANIC ACIDS
The Interaction of Water with Organic Solute Species,
W74-03762 1B

ORGANIC CARBON
Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

ORGANIC COMPOUNDS
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

ORGANIC MATTER
Primary Production and Destruction of Organic Matter in 2 Lakes of Different Types, (In Russian),
W74-03944 5C

Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

Increasing the Processing Rate of Particulate Organic Matter in Streams,
W74-04202 5B

Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

Organic Matter of the Soil in the Kiev Reservoir and its Role in the Development of Benthic Algae, (In Russian),
W74-04281 5C

Primary Production of Phytoplankton and Destruction of Organic Matter in the Prut River, (In Russian),
W74-04284 5C

ORGANOPHOSPHORUS COMPOUNDS
Test for Anticholinesterase Materials in Water,
W74-03838 5A

OSMOTIC PRESSURE
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

OSWEGO RIVER BASIN (N
Chemical Quality of Surface Water in the Eastern Oswego River Basin, New York,
W74-03817 5A

OUTDOOR CULTURE

OUTDOOR CULTURE
Intensive Outdoor Culture of Marine Phytoplankton Enriched with Treated Sewage Effluent,
W74-04103 5D

OUTFALL SEWERS
Cleaning up a River,
W74-03968 5G

OXIDATION
The Effects of Artificial Sunlight Upon Floating Oils,
W74-03777 5B

Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

OXIDATION-REDUCTION POTENTIAL
Stability Field Diagrams as Aids in Iron Chemistry Studies,
W74-04163 2K

OXINE
Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

OXYGEN
Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

Effect of Low Oxygen Concentration on Survival and Emergence of Aquatic Insects,
W74-04100 5C

An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level,
W74-04104 5A

OXYGEN BALANCE
Potamological Effects of Fish Hatchery Discharge on the Jordan River, Northern Lower Michigan,
W74-03903 5C

OXYGEN DEMAND
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

OXYGEN REQUIREMENT
The Effect of Thermal Acclimation on Heart rate and Oxygen Consumption of Frogs During Submergence,
W74-04242 5A

OXYGEN REQUIREMENTS
The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

PACIFIC OCEAN
Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

PALEOLIMNOLOGY
Species Diversity of Chydorid Fossil Communities in the Mississippi Valley,
W74-03941 5C

PAMLICO ESTUARY (N
Coagulation in Estuaries,
W74-04257 5B

PARTICLE SIZE
Gelatin Coated Microscope Slides in Sedimentary Size Analysis,
W74-04055 2J

Lognormal Size Distribution of Particulate Matter,
W74-04058 2J

PATH OF POLLUTANT
Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

PATH OF POLLUTANTS
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

Natural Mixing Processes in Rivers,
W74-03790 5B

Mechanics of Heat Transfer in Nonstratified Open-Channel Flows,
W74-03792 5B

Some Effects of Wastes on Natural Waters,
W74-03793 5B

Dispersion of Contaminants Attached to Sediment Bed Load,
W74-03797 5B

Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

Water Quality Cycle--Reflection of Activities of Nature and Man,
W74-04263 5B

The Influence of Suspended Particles on the Precipitation of Iron in Natural Waters,
W74-04272 5B

PATHOGENIC BACTERIA
Occupationally Related Health Hazards in Wastewater Treatment Systems,
W74-03853 5C

PEAK DISCHARGE
Floods of the 1970 and 1971 Water Years in Mississippi,
W74-03816 2E

PEAR VARIETIES
Drought Resistance of Pear Varieties of the Main Ecological-Geographic Groups. (In Russian),
W74-04220 3F

PEAT
The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

PENNSYLVANIA
An Application Study in Water Distribution Control,
W74-03755 8C

Commonwealth V. Harmar Coal Co. (Denial of Mine Drainage Permits),
W74-03984 6E

The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

PENTAFLUOROBENZYL ESTERS
Formation of Pentafluorobenzyl Derivatives for the Identification and Quantitation of Acid and Phenol Pesticide Residues,
W74-03850 5A

PERCH (PIKE)
The Biology of Pike Perch in the Arnasaya Lakes System. (In Russian),
W74-03961 2H

PERCOLATION
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

PERIPHYTON
Potamological Effects of Fish Hatchery Discharge on the Jordan River, Northern Lower Michigan,
W74-03903 5C

Preliminary Data About the Seasonal Changes and Vertical Stratification of Periphyton from the Middle Reach of the River Danube,
W74-04294 5A

PERMAFROST
Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

A Landscape Zonation for the Southern and Central Mackenzie River Valley Based on Terrain Permafrost Characteristics,
W74-04266 2C

PERMEABILITY
Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

New Single-Well Test for Determining Vertical Permeability,
W74-04150 8G

Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

Gypsum as Improver of the Permeability of Grumusol (Typic Pellustert) in the Kano Plains of Kenya,
W74-04193 2G

PERMITS
Commonwealth V. Harmar Coal Co. (Denial of Mine Drainage Permits).
W74-03984 6E

Fisherman Quotas: A Tentative Suggestion for Domestic Management,
W74-03991 6E

PERU
Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

PESTICIDE RESIDUES
Formation of Pentafluorobenzyl Derivatives for the Identification and Quantitation of Acid and Phenol Pesticide Residues,
W74-03850 5A

PESTICIDES
Microbiological Determination of Thiram,
W74-03846 5A

PETROLEUM PROCESS CATALYSTS
Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode,
W74-03864 5A

PETROLEUM PRODUCTS
Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode,
W74-03864 5A

PETROLEUM REFINING INDUSTRY
The Impact of Costs Associated with New Environmental Standards upon the Petroleum Refining Industry. Part II. Structure of the Industry.
W74-04076 3E

PHAEOPHYTA
North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

PHENOLIC PESTICIDES
Formation of Pentafluorobenzyl Derivatives for the Identification and Quantitation of Acid and Phenol Pesticide Residues,
W74-03850 5A

PHENOLICS
Problems in Phenolics-Modeling Methods in the Ohio River at Wheeling, W. Va.,
W74-03849 5A

PHENOLOGY
Fire Climates in the Southwest,
W74-04130 4A

PHENOLS
The Interaction of Water with Organic Solute Species,
W74-03762 1B

Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

Mixed Culture Biooxidation of Phenol. II. Steady State Experiments in Continuous Culture,
W74-03880 5C

Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

PHEOPHYTIN
Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

PHILADELPHIA
An Application Study in Water Distribution Control,
W74-03755 8C

PHOSPHATES
Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

The Relation Between the Synthesis of Inorganic Polyphosphate and Phosphate Uptake by Chlorella Vulgaris,
W74-04094 5C

Phosphates and the Environment,
W74-04107 5C

PHOSPHORUS
Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

Nitrogen and Phosphorus Losses in Surface Runoff from Agricultural Land as Influenced by Placement of Broadcast Fertilizer,
W74-04096 5C

Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

PHOSPHORUS COMPOUNDS
Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

PHOTOGRAMMETRY
Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

PHOTOGRAPHIC INTERPRETATIONS
Aerial Detection of Spill Sources,
W74-04196 5A

PHOTOSYNTHESIS
Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

PHYSICAL-CHEMICAL TREATMENT
Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

PHYSICOCHEMICAL STUDIES
Algae from Some Lakes in Nordmarka Near Oslo,
W74-04289 2H

PHYSIOCHEMICAL PROPERTIES
The Interaction of Water with Organic Solute Species,
W74-03762 1B

PHYTOMASS
Annual Increase of Aboveground Phytomass of Some Tundra Shrubs, (In Russian),
W74-04286 2I

PHYTOPHAGOUS FISH
Use of Phytophagous Fish to Control Aquatic Plants,
W74-04106 3B

PHYTOPLANKTON
An Ecological Evaluation of a Thermal Discharge. Part II: The Distribution of Phytoplankton and Primary Productivity Near the Western Shore of Lake Erie,
W74-03936 5C

Primary Productivity in the Crapina-Jijila Lake-Complex (Danube Flooded Area) During Severe Flooding,
W74-04194 5C

Temperature and Phytoplankton Growth in the Sea,
W74-04233 5C

Primary Production of Phytoplankton and Destruction of Organic Matter in the Prut River, (In Russian),
W74-04284 5C

PHYTOPLANKTON DISTRIBUTION
Hydrobiological Studies of 2 Shallow Ponds: Observations on Temperature and Plankton Distribution and the Influence of a Plant Cover Containing Lemna minor, (In French),
W74-04291 2H

PICKWICK LAKE (ALA)
The Economic Impact of the Ban on Commercial Fishing on Lake Pickwick,
W74-03910 6B

PIEZOELECTRIC TRANSDUCERS
Piezoelectric Pressure Transducers.
W74-03870 7B

PIGMENTS
Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

PIPE FLOW
Temperature Profiles for Turbulent Flow of High Prandtl Number Fluids,
W74-04232 8B

PIPELINES
Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

PIPES
Pollution of Drinking Water by Oil in the Pipes of New Buildings, (In German),
W74-03950 5B

Drainage Design as Influenced by Conditions in the Vicinity of the Drain Line,
W74-04200 4A

PITTING
Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces.
W74-04156 8G

Corrosion and Corrosion Control,
W74-04161 8G

PLANKTON
Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part III: Plankton Survey,
W74-03934 5C

A Comparative Study of Plankton Respiration in an Acid Polluted Lake and Its Acid Free Embayments,
W74-03935 5C

Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

PLANNING
Water Resources and Social Choices,
W74-03951 6B

Pyramid Lake Recreation Development Plan. Initial Facilities,
W74-03955 6B

Los Banos Reservoir Recreation Development Plan,
W74-03956 6B

Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience,
W74-03965 6B

Study of Water Resources and Management.
W74-03970 6E

Shore Erosion Control.
W74-03974 6E

Fisherman Quotas: A Tentative Suggestion for Domestic Management,
W74-03991 6E

Planning and Zoning-Land Subdivisions.
W74-04006 6E

Florida Water Resources Act of 1972.
W74-04019 6A

Water-Supply Planning in Developing Countries,
W74-04117 6A

Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

PLANT BREEDING
Increasing Water Utilization Efficiency of a Pasture Grass by Increasing Aftermath Through Plant Selection,
W74-03773 3F

Arizona Indian Corn (Zea mays L.),
W74-03926 3F

PLANT COVER
Hydrobiological Studies of 2 Shallow Ponds: Observations on Temperature and Plankton Distribution and the Influence of a Plant Cover Containing Lemna minor, (In French),
W74-04291 2H

PLANT GROWTH
Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

PLANT PHYSIOLOGY
Arizona Indian Corn (Zea mays L.),
W74-03926 3F

Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses,
W74-04127 3F

PLANT TISSUE
Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses,
W74-04127 3F

PLANT TISSUES
Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

PLANTING MANAGEMENT
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

PLANTS (LONG-ROOTED)
Anti-Erosive Role of Natural Plants in Low Foot-Hills Bordering the Ferghana Basin, (In Russian),
W74-04287 4D

PLANTS (VESSEL CONSTRICTION)
Changes in Vessel Diameter in Two Species of Herbaceous Plants, (In Russian),
W74-04280 2I

PLATTE RIVER BASIN (WYO)
Systems Simulation of Economic Factors and Their Relation to the Water System of Wyoming's Platte River Basin,
W74-03892 6A

PLUMES
Comparison of Measured and Calculated Radiation Exposure from a Boiling Water Reactor Plume,
W74-04175 5B

PLUTONIUM-239
Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

POLAND
Chemical Changes in the Water and Accumulation Stratum of Soils in Ponds Fertilized with Beet-Sugar Factory Wastes,
W74-04110 5C

POLAROGRAPHIC ANALYSIS
Direct Determination of Sulfide by Rapid Direct Current Polarography.
W74-03865 2K

POLITICAL CONSTRAINTS
Let's Enforce the Rules.
W74-03891 6E

POLLUTANT IDENTIFICATION
Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water.
W74-03767 5A

Test for Anticholinesterase Materials in Water.
W74-03838 5A

Microbiological Determination of Thiram.
W74-03846 5A

Trace Organics In Water: Their Isolation and Identification.
W74-03848 5A

Formation of Pentafluorobenzyl Derivatives for the Identification and Quantitation of Acid and Phenol Pesticide Residues.
W74-03850 5A

Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels.
W74-03851 5A

Identifying Source of Petroleum by Infrared Spectroscopy.
W74-03854 5A

Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode.
W74-03864 5A

Direct Determination of Sulfide by Rapid Direct Current Polarography.
W74-03865 2K

Simultaneous Determination of Ferrocyanide and Ferricyanide in Aqueous Solutions Using Infrared Spectrometry.
W74-03866 5A

Determination of Submicrogram Levels of Phenol in Water.
W74-03868 5A

A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

A Solvent-Extraction Method for the Determination of Manganese-54 in Sea Water,
W74-03886 5A

Detection and Quantitative Measurement of Fecal Water Pollution Using a Solid-Injection Gas Chromatographic Technique and Fecal Steroids as a Chemical Index,
W74-03887 5A

Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

Yellow-Green Algae of Wastes, (In Ukranian),
W74-03919 5A

Aerial Detection of Spill Sources,
W74-04196 5A

Environmental Applications of Advanced Instrumental Analyses: Assistance Projects, FY 72,
W74-04197 5A

Determination of Cation Capacity of Humic Acids by Thin Ash Content, (In Estonian),
W74-04299 5A

POLLUTANTS
Common Property, Congestion, and Environmental Pollution,
W74-03958 6G

The Environmental and Regulatory Aspects of the Breeder Reactor,
W74-04238 5B

POLLUTION ABATEMENT
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

Accounting for Pollution: Pollution Abatement and the National Product,
W74-03959 5G

Cleaning up a River,
W74-03968 5G

United States v. United States Steel (Refuse Act Violation).
W74-04011 6E

The Ocean Dumping Convention--A Hopeful Beginning,
W74-04032 5G

Developments in Water Utility Law, 1972-1973, American Bar Association Review.
W74-04037 5G

The Impact of Costs Associated with New Environmental Standards upon the Petroleum Refining Industry. Part II. Structure of the Industry.
W74-04076 3E

The Economic Impact of Pollution Control. An Overview, a Summary of Research Studies.
W74-04077 5G

Economic Impact of Anticipated Paper Industry Pollution-Abatement Costs. Part III. Economic Analysis.
W74-04078 5G

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part I. Introduction and Executive Summary.
W74-04081 5G

POLLUTION ABATEMENT DEVICES
Accounting for Pollution: Pollution Abatement and the National Product,
W74-03959 5G

POLLUTION EFFECTS
The Pollution Sub-System,
W74-03964 6G

POLYPHOSPHATE
The Relation Between the Synthesis of Inorganic Polyphosphate and Phosphate Uptake by Chlorella Vulgaris,
W74-04094 5C

PONDS
Hydrobiological Studies of 2 Shallow Ponds: Observations on Temperature and Plankton Distribution and the Influence of a Plant Cover Containing Lemna minor, (In French),
W74-04291 2H

PORES
Nuclear Spin-Lattice Relaxation of Liquids Confined in Porous Solids,
W74-04157 2F

POROSITY
Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

POROUS SOLIDS
Nuclear Spin-Lattice Relaxation of Liquids Confined in Porous Solids,
W74-04157 2F

PORT AUTHORITIES
Port, Harbor and Terminal Districts; Powers and Duties; Bonds.
W74-03982 6E

PORTLANT CEMENT
Well Grouting and Well Protection,
W74-04164 8F

POTABLE WATER
Pollution of Drinking Water by Oil in the Pipes of New Buildings, (In German),
W74-03950 5B

Safe Drinking Water Act of 1972--S.3994.
W74-04030 5G

The Application of Fundamental Limnological Research in Water Supply System Design and Management,
W74-04111 5C

POTOMAC RIVER
The Potomac, Water Quality Planning.
W74-03977 5G

POURBAIX DIAGRAMS
Corrosion and Corrosion Control,
W74-04161 8G

POWER SUPPLIES
Guide to Selecting Programmable DC Power Supplies,
W74-03863 7C

PRANDTL NUMBERS
Temperature Profiles for Turbulent Flow of High Prandtl Number Fluids,
W74-04232 8B

PRE-TREATMENT (WATER)
Clogging in Recharge Wells, Causes and Cures,
W74-03824 4B

PRECIPITATION (ATMOSPHERIC)
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

PREDATOR-SACRIFICE MODEL
A Study of a Generalized Mathematical Model 'Predator-Sacrifice,' (In Russian),
W74-04092 2I

PREDICTION
Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2L

PREDICTION INTERVALS
A Survey of Prediction Intervals and Their Applications,
W74-03858 7C

PRESERVATION
Loss of Mercury from Water During Storage,
W74-04048 5A

PRESSURE
A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

A Method for Determining the Static Pressure of a Well from Buildup Data,
W74-04162 8G

PRESSURE HEAD
An Experimental Study of Soil Water Flow Systems Involving Hysteresis,
W74-03760 2G

PRESSURE TRANSDUCERS
Piezoelectric Pressure Transducers.
W74-03870 7B

PRICES
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

PRICING
The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part II. Structure of the Industry.
W74-04082 5G

PRIMARY PRODUCTION
Some Environmental Factors Determining the Primary Production of the Mozhaisk Reservoir, (In Russian),
W74-03939 5C

Primary Production and Destruction of Organic Matter in 2 Lakes of Different Types, (In Russian),
W74-03944 5C

Primary Production of Phytoplankton and Destruction of Organic Matter in the Prut River, (In Russian),
W74-04284 5C

PRIMARY PRODUCTIVITY
An Ecological Evaluation of a Thermal Discharge. Part II: The Distribution of Phytoplankton and Primary Productivity Near the Western Shore of Lake Erie,
W74-03936 5C

Primary Productivity in Relation to Chemical Parameters in Cheat Lake, West Virginia,
W74-04089 5C

Primary Productivity in the Crapina-Jijila Lake-Complex (Danube Flooded Area) During Severe Flooding,
W74-04194 5C

PROBABILITY
Lognormal Size Distribution of Particulate Matter,
W74-04058 2J

PROCESS CONTROL
Process Control of Activated Sludge Treatment,
W74-03764 5D

PRODUCTION
Experiment in Computing the Total Production of Zooplankton Using Ural Lakes as an Example (In Russian),
W74-04120 2H

PRODUCTIVITY
Productivity of the River Thames at Reading,
W74-04093 5C

Structure and Productivity of the Phytomass of Gigantic Bunch-Forming Grasses in the Amu Darya Floodplain, (In Russian),
W74-04282 2I

PROGRAMMABLE POWER SUPPLIES
Guide to Selecting Programmable DC Power Supplies,
W74-03863 7C

PROJECT BENEFITS
Externalities, Shadow Prices, and Benefit-Cost Calculations,
W74-03960 6B

PROJECT PLANNING
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

A General Procedure for Consumption-Density Studies,
W74-04040 6D

PROJECTS
Water Resources Newsletter, June 1973.
W74-03774 4A

PROTEINS
Phenotypic Variability of the Envelope Proteins of Klebsiella aerogenes,
W74-03882 5C

PROTEOLYTIC ACTIVITY
Proteolytic Activity of Saprophytic Microflora in the Dneprodzerzhinskoe Reservoir, (In Russian),
W74-03949 5C

PSEUDOMONAS
Microflora of Nutrient Solution in Soilless Growing of Vegetable Crops, (In Russian),
W74-04235 3F

PUBLIC HEALTH
Assault on a Lake,
W74-03975 5G

Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

PUBLIC LANDS
Petterson V. Froehlke (Challenge to Dredging Permit Issued by Corps of Engineers).
W74-03983 6E

PUBLIC PARTICIPATION
Water Resources and Social Choices,
W74-03951 6B

PUBLIC RIGHTS
Petterson V. Froehlke (Challenge to Dredging Permit Issued by Corps of Engineers).
W74-03983 6E

PUBLICATIONS
Water Resources Newsletter, June 1973.
W74-03774 4A

PULASKI COUNTY
Temporary Navigation Lock (Modification of Lock and Dam 53) (Final Environmental Impact Statement), Ohio River, Illinois and Kentucky.
W74-03966 8A

PULP AND PAPER INDUSTRY
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

Economic Impact of Anticipated Paper Industry Pollution-Abatement Costs. Part III. Economic Analysis.
W74-04078 5G

PUMPING
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

PUMPS
Operation and Maintenance of Centrifugal Pumps,
W74-04146 8C

Better Pump Installation,
W74-04154 8C

QUALITY CONTROL
A Systematic Approach to the Analysis of Means. Part II. Analysis of Contrasts. Part III. Analysis of Non-Normal Data,
W74-03837 7C

Water Sampling and Laboratory Service,
W74-04024 5A

RADIATION
The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

Leaf Orientation of a Cotton Plant,
W74-04132 3F

RADIO ALARM REPORTING SYSTEM
Radio System Monitors Pump Stations,
W74-04148 8G

RADIO WAVES
Integrated Measurement of Soil Moisture by Use of Radio Waves,
W74-03772 2C

RADIOACTIVE WASTE DISPOSAL
Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

RADIOACTIVE WASTES
The Environmental and Regulatory Aspects of the Breeder Reactor,
W74-04238 5B

RADIOACTIVITY
Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

Environmental Radioactivity - Ispra 1971,
W74-04176 5B

Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

Natural Radiation Loads on the Eggs of Marine and Fresh Water Organisms,
W74-04182 5C

Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

Aerial Radiological Measuring Survey of the Area Surrounding the Monticello Nuclear Generating Plant, Monticello, Minnesota, August 1970.
W74-04185 5B

Aerial Radiological Measuring Survey of the Area Surrounding Big Rock Point Nuclear Plant, Big Rock Point, Michigan, 1968,
W74-04186 5B

Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

RADIOACTIVITY EFFECTS
Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

Radiation Reaction of the Adenohypophysis-Gonads System in Cold-Blooded Animals,
W74-04180 5C

Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

RADIOISOTOPES
Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

RAINFALL DISPOSITION
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

RAMAPO RIVER BASIN (N
Water Resources of the New Jersey Part of the Ramapo River Basin,
W74-03806 4B

RANGE MANAGEMENT
Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

RATES OF APPLICATION
Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

READING (ENGLAND)
Productivity of the River Thames at Reading,
W74-04093 5C

REASONABLE USE
Private Rights in Waters.
W74-03973 6E

RECENT EPOCH
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

Basic Types of Recent Bottom Sediments of the Mediterranean Sea, Their Mineralogy and Geochemistry (Osnovnyye tipy sovremennykh donnykh osadkov Sredizemnogo morya, ikh mineralogiya i geokhimiya),
W74-03828 2J

Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

RECHARGE
Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

RECHARGE PONDS
The Hydraulics of Artificial Recharge,
W74-03820 4B

RECLAIMED WATER
Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

Groundwater Recharge for Waste Water Reclamation and/or Storage of Supplies: A Cost Comparison with Conventional Methods,
W74-03825 5D

RECLAMATION
A Programme for Studies of the Recovery of Polluted Lakes. The Effect of Chemical Sewage Treatment and Diversion of Sewage,
W74-04105 5C

RECREATION
The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

RECREATION DEVELOPMENT
Los Banos Reservoir Recreation Development Plan,
W74-03956 6B

RECREATION FACILITIES
Pyramid Lake Recreation Development Plan. Initial Facilities,
W74-03955 6B

Los Banos Reservoir Recreation Development Plan,
W74-03956 6B

RECTIFIERS
Cathodic Protection in Congested Areas,
W74-04159 8G

RECYCLING
Recycled Water,
W74-03976 5D

Water Recovery and Solid Waste Processing for Aerospace and Domestic Applications.
W74-04053 5D

RED CEDAR RIVER (MICH)
The Characterization and Influence of Domestic Drain Effluents on the Red Cedar River,
W74-03895 5B

RED SEA
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

REEFS
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

REFORESTATION
Experiences with the Correction of Disordered Streams of the Alpine Type, (In Italian),
W74-04276 4D

REFRACTION (WATER WAVES)
The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

REFUSE
United States v. Tobin Packing Co. (Violation of Rivers and Harbors Act).
W74-04008 6E

REGIONAL ANALYSIS
The Optimal Expansion of a Water Resources Systems,
W74-03754 6A

Some Data on the Water Economy and the Utilization of Water Resources in Bulgaria, Including Irrigation,
W74-03954 3F

REGIONAL DEVELOPMENT
Social Accounting Approaches to Water Resource Use in Economic Development.
W74-03907 6B

Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience,
W74-03965 6B

REGIONAL ECONOMICS
Regional Interdependencies and External Diseconomies,
W74-03912 6B

REGIONAL PLANNING
Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

Water-Supply Planning in Developing Countries,
W74-04117 6A

REGIONS
Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

REGRESSION ANALYSIS
An Application Study in Water Distribution Control,
W74-03755 8C

REGULATION
National Water Commission Reports.
W74-03890 6B

Flood Damage Prevention-Construction of Buildings,
W74-03992 6E

Regulation of Brain and Eye Temperatures by the Bluefin Tuna,
W74-04239 5C

REHABILITATION
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

REMOTE CONTROL
Radio System Monitors Pump Stations,
W74-04148 8G

Remote Control is Coming,
W74-04153 8C

REMOTE SENSING
Application of Remote Sensing to River Mechanics,
W74-03800 2E

Aerial Radiological Measuring Survey of the Area Surrounding the Monticello Nuclear Generating Plant, Monticello, Minnesota, August 1970.
W74-04185 5B

Aerial Radiological Measuring Survey of the Area Surrounding Big Rock Point Nuclear Plant, Big Rock Point, Michigan, 1968,
W74-04186 5B

Aerial Detection of Spill Sources,
W74-04196 5A

Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

REPRODUCTION
Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

Radiation Reaction of the Adenohypophysis-Gonads System in Cold-Blooded Animals,
W74-04180 5C

REPTILES
Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

RESEARCH AND DEVELOPMENT
Alaska Water Resources Research Needs for the 70's.
W74-03757 6B

RESEARCH NEEDS
Alaska Water Resources Research Needs for the 70's.
W74-03757 6B

RESERVOIR CONSTRUCTION
Ohio v. Callaway (Injunction Action for Failure to Comply with Nepa).
W74-04009 6E

RESERVOIR OPERATION
Sequential Stochastic Optimization for Reservoir System,
W74-03914 4A

Petrus V. Arkansas Irrigation Co. (Injunction to Prevent Interference with Flowage Rights).
W74-03994 6E

RESERVOIR RELEASES
Friends of the Earth v. Armstrong (Environmental Protection Suit).
W74-04007 6E

RESERVOIRS
A Comparative Study of Plankton Respiration in an Acid Polluted Lake and Its Acid Free Embayments,
W74-03935 5C

An Analysis of the Zooplankton Community in an Acid Polluted Reservoir,
W74-03938 5C

Pyramid Lake Recreation Development Plan. Initial Facilities,
W74-03955 6B

Los Banos Reservoir Recreation Development Plan,
W74-03956 6B

Supervision of Dams and Reservoirs.
W74-03999 6E

Exchangeable Cations in Soils of the Dnieper Reservoirs,
W74-04255 2H

RESIDUAL INFORMATION MODEL
Residual Information Model with Application to Heat from Thermal Power Plants,
W74-03911 5B

RESINS
Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

RESISTANCE
Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

RESISTANCE NETWORKS
A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

RESISTIVITY
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

RESOURCE ALLOCATION
Externalities, Environmental Pollution and Allocation in Space: A General Equilibrium Approach,
W74-04084 5G

RESOURCES DEVELOPMENT
Alaska Water Resources Research Needs for the 70's.
W74-03757 6B

RESPIRATION
A Comparative Study of Plankton Respiration in an Acid Polluted Lake and Its Acid Free Embayments,
W74-03935 5C

Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

The Effect of Thermal Acclimation on Heart rate and Oxygen Consumption of Frogs During Submergence,
W74-04242 5A

RETURN FLOW
Agricultural Impact on Water Quality in Western Rivers,
W74-03796 5B

REVIEWS
Water Resources Newsletter, June 1973.
W74-03774 4A

RHENIUM
Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

RHEOLOGY
The Structural-Continuum Theory of Dilute Suspensions of Rigid Ellipsoidal Particles,
W74-04249 8B

RHINE RIVER
The Rhein Study,
W74-03788 2J

RHODOPHYTA
North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

RIO GRANDE RIVER
A Bill to Authorize Extensions of the American Canal at El Paso, Texas.
W74-03986 6E

RIPARIAN LAND
People V. Mack: A Sportsman's Definition of Navigability,
W74-03967 6E

RIPARIAN PLANTS
Architecture of Riparian Forest Vegetation of Rivers and Creeks of French Guiana,
W74-04285 2I

RIPARIAN RIGHTS
People V. Mack: A Sportsman's Definition of Navigability,
W74-03967 6E

Private Rights in Waters.
W74-03973 6E

RIPPLE MARKS
Pseudo-Crosslamination Formed by Climbing Adhesion Ripples,
W74-04062 2J

RISKS
Uncertainties in Hydrologic Models,
W74-03916 2A

RIVER BASIN COMMISSIONS
The Potomac, Water Quality Planning.
W74-03977 5G

Interstate Compacts and Regional Water Resources Planning and Management,
W74-04000 6E

RIVER BASIN DEVELOPMENT
Systems Simulation of Economic Factors and Their Relation to the Water System of Wyoming's Platte River Basin,
W74-03892 6A

RIVER BEDS
On The Extent of Bottom Erosion in Large Rivers (Ueber den Umfang der Schlenerosion in grossen Gewaessern),
W74-04252 2J

RIVER SYSTEMS
Application of Remote Sensing to River Mechanics,
W74-03800 2E

RIVER THAMES (ENGLAND)
Productivity of the River Thames at Reading,
W74-04093 5C

RIVERS
Quasi 2-year Variation in Runoff of USSR Rivers (Kvazidvukhletnyaya variatsiya v stoke rek SSSR),
W74-03834 2E

A Map of Annual River Runoff in the Pamirs and Pamir-Alay Mountains (Karta godovogo stoka rek Pamira i Pamiro-Alaya),
W74-03836 2E

Ohio Mussel Fisheries Investigation. Part III: Plankton Survey,
W74-03934 5C

Nutrient Budgets in Rivers,
W74-03947 5C

RIVERS AND HARBORS ACT
United States v. Tobin Packing Co. (Violation of Rivers and Harbors Act).
W74-04008 6E

United States v. Cannon (Injunction Against Violation of Rivers and Harbors Act).
W74-04010 6E

United States v. United States Steel (Refuse Act Violation).
W74-04011 6E

ROCK PROPERTIES
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

ROMANIA (CRAPINA-JIJILA LAKE COMPLEX)
Primary Productivity in the Crapina-Jijila Lake-Complex (Danube Flooded Area) During Severe Flooding,
W74-04194 5C

ROOT MASS
Accumulation of Root Mass in Perennial Legume Plots on Eroded Soils (In Azerbaidzhan),
W74-03874 3F

ROOT SYSTEMS
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

ROTIFER PLANKTON
Rotifer Plankton in Brackish and Freshwater Localities in Central Sweden,
W74-04041 5C

ROTIFERS
The Rotifers of the Submerged Mosses and Other Biotopes in the Dammed Regions of the Danube at the German-Austrian Frontier, (In German),
W74-04001 2I

ROUGHNESS (HYDRAULIC)
Flow Over Alluvial Bed,
W74-03786 2E

Flow Resistance over Short Simulated Vegetation and Various Tall Simulated Vegetation Groupings on Flow Resistance and Sediment Yield,
W74-03787 2E

RUNOFF
Annual Compilation and Analysis of Hydrologic Data for Elm Fork Trinity River, Trinity River Basin, Texas, 1971,
W74-03818 2E

Quasi 2-year Variation in Runoff of USSR Rivers (Kvazidvukhletnyaya variatsiya v stoke rek SSSR),
W74-03834 2E

Flood Damage Prevention-Construction of Buildings,
W74-03992 6E

RURAL AREAS
Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

RUST
Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces.
W74-04156 8G

RUSTING
Synergistic Inhibition of Ferric Ion Corrosion During Chemical Cleaning of Metal Surfaces,
W74-04169 8G

SAGEBRUSH
Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

SAINFOIN
Investigation of the Dynamics of the Moisture State of the Soil Under Several Years of Forage Crops and Under Sainfoin, (In Czech),
W74-03917 3F

SALINE DEPOSITS
Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

SALINE LAKES
A Meromictic Lake in Australia,
W74-04101 5C

SALINE WATER
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

Estuaries Under Attack,
W74-04033 6G

On Saltwater Hot Springs in the Coast Area of Western Anatolia, Turkey (Uber Salzwasser-Thermen Im Kustenland Von West-Anatolien, Turkei),
W74-04270 2F

SALINE WATER INTRUSION
Conservation, Geology and Water Resources,
W74-04013 6E

A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

Effects of the Feeder Canal on the Water Resources of the Fort Lauderdale Prospect Well-Field Area,
W74-04259 5G

SALINITY
Agricultural Impact on Water Quality in Western Rivers,
W74-03796 5B

Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

SALTATION
Pseudo-Crosslamination Formed by Climbing Adhesion Ripples,
W74-04062 2J

SAMPLE PREPARATION
Colorimetric Determination of Boron in Aqueous Solutions and in Borosilicate Glass by Solvent Extraction,
W74-03862 5A

Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode,
W74-03864 5A

SAMPLE SPLITTERS
Water-Sediment Splitter for Runoff Samples Containing Coarse-Grained Sediment,
W74-03780 2J

SAMPLING
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

Water-Sediment Splitter for Runoff Samples Containing Coarse-Grained Sediment,
W74-03780 2J

Suspended-Sediment Sampling Variability,
W74-03801 2J

Thermophilic Fungi in a Municipal Waste Compost System,
W74-03875 5A

Apparatus for Studies of Artificial Sediments,
W74-04057 2J

Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

SAN DIEGO COUNTY (CALIF)
Radio System Monitors Pump Stations,
W74-04148 8G

SAN JOAQUIN VALLEY
West Side Crop Adaptability Study.
W74-03922 3F

SAN JOAQUIN VALLEY (CALIF)
Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California),
W74-04274 7C

SAN LUIS OBISPO COUNTY (CALIF)
Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

SAND BARS
Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2L

SAND FILTER
The Effectiveness of Sand Filters for the Removal of Colloidal Manganese Oxides from Water Using Selected Cations as Filter Aids,
W74-03893 5F

SAND PRODUCTION
Application of Engineering to Well Construction and Development at Vernon,
W74-04167 8B

SAND SPITS
Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2L

SANDS
ERGS,
W74-04264 2J

SANTA BARBARA COUNTY (CALIF)
Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

SAPROPHYTES
Protection of Saprophytes as the Main Factor in a Program for Protection of Water Environments, (In Polish),
W74-04297 5G

SCHEDULING
Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

SCOTLAND (LOCK LEVEN)
The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

SCULPINS
The Dynamics of Brown Trout (Salmo trutta) and Sculpin (Cottus spp.) Populations as Indicators of Eutrophication,
W74-03904 5C

SCYTALIDIUM
Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

SEA SURFACE TEMPERATURE
An Oceanographic Investigation of Thermal Changes in Monterey Bay, California, September 1971 - January 1972,
W74-04223 2L

SEA WATER
A Solvent-Extraction Method for the Determination of Manganese-54 in Sea Water,
W74-03886 5A

Temperature and Phytoplankton Growth in the Sea,
W74-04233 5C

SEASONAL
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

Alfalfa Quality: Is There a Difference,
W74-03930 3F

Seasonal Variations of the Salinity in Some Profiles and in the Water Table of the Sodic Soils of Camargue: Preliminary Results (In French),
W74-04124 2G

Preliminary Data About the Seasonal Changes and Vertical Stratification of Periphyton from the Middle Reach of the River Danube,
W74-04294 5A

SECONDARY RECOVERY (OIL)
The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

SEDIMENT TRANSPORT
The Rhein Study,
W74-03788 2J

Regime Problems of Rivers Formed in Sediment,
W74-03789 2J

Dispersion of Contaminants Attached to Sediment Bed Load,
W74-03797 5B

Suspended-Sediment Sampling Variability,
W74-03801 2J

A Reconnaissance of Streamflow and Fluvial Sediment Transport, Incline Village Area, Lake Tahoe, Nevada, Second Progress Report 1971,
W74-04050 2J

Pseudo-Crosslamination Formed by Climbing Adhesion Ripples,
W74-04062 2J

Flume Experiments on the Transition from Ripples to Lower Flat Bed with Increasing Sand Size,
W74-04063 2J

The Threshold of Sediment Movement Under Oscillatory Water Waves,
W74-04065 2J

Modern Sediments of Willapa Bay, Washington: A Coastal Plain Estuary,
W74-04209 2L

An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

ERGS,
W74-04264 2J

SEDIMENT YIELD
Flow Resistance over Short Simulated Vegetation and Various Tall Simulated Vegetation Groupings on Flow Resistance and Sediment Yield,
W74-03787 2E

Upslope Erosion Analysis,
W74-03799 2J

Sediment Production in a Small Appalachian Watershed During Spring Runoff: The Eaton Basin, 1970-1972,
W74-04267 2J

SEDIMENTARY STRUCTURES
Internal Geometry and Origin of Vegetated Coastal Sand Dunes,
W74-04061 2J

SEDIMENTATION
River Response,
W74-03785 2E

Internal Geometry and Origin of Vegetated Coastal Sand Dunes,
W74-04061 2J

Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2L

SEDIMENTOLOGY
Water-Sediment Splitter for Runoff Samples Containing Coarse-Grained Sediment,
W74-03780 2J

Basic Types of Recent Bottom Sediments of the Mediterranean Sea, Their Mineralogy and Geochemistry (Osnovnyye tipy sovremennykh donnykh osadkov Sredizemnogo morya, ikh mineralogiya i geokhimiya),
W74-03828 2J

Gelatin Coated Microscope Slides in Sedimentary Size Analysis,
W74-04055 2J

Apparatus for Studies of Artificial Sediments,
W74-04057 2J

Lognormal Size Distribution of Particulate Matter,
W74-04058 2J

SEDIMENTS
Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part II: Water Chemistry and Sediment Analyses,
W74-03933 5C

Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

Evaluation of Groundwater Resources in Livermore Valley, California,
W74-04201 2F

SELENASTRUM CAPRICORNUTUM
Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

SELENIUM
Selenium in Nebraska's Groundwater and Streams,
W74-03813 5B

Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

SELF-PURIFICATION
Chemical Changes in the Water and Accumulation Stratum of Soils in Ponds Fertilized with Beet-Sugar Factory Wastes,
W74-04110 5C

Protection of Saprophytes as the Main Factor in a Program for Protection of Water Environments, (In Polish),
W74-04297 5G

SEMIARID CLIMATES
An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

SEPARATION TECHNIQUES
Column Partition Chromatographic Determination of Sodium Alkane Monosulfonates,
W74-03867 5A

Improvements in the Wet Oxidation-Dithizone Method for Determining Low Mercury Levels in Food,
W74-03869 5A

Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

SESTON
Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

SETTLING VELOCITY
Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

SEWAGE
Water Pollution Control.
W74-04015 6E

SEWAGE BACTERIA
Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

SEWAGE DISPOSAL
Water Pollution Control.
W74-04015 6E

SEWAGE EFFLUENTS
Brave New World of TOC and TOD.
W74-03856 5A

Irrigated Recreational Turfgrass with Sewage Effluent,
W74-03929 3C

Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

SEWAGE LAGOONS
Chemical Changes in the Water and Accumulation Stratum of Soils in Ponds Fertilized with Beet-Sugar Factory Wastes,
W74-04110 5C

SEWAGE TREATMENT
Process Control of Activated Sludge Treatment,
W74-03764 5D

Recycled Water,
W74-03976 5D

Water Pollution Control.
W74-04015 6E

U-Tube Aeration,
W74-04046 5D

Intensive Outdoor Culture of Marine Phytoplankton Enriched with Treated Sewage Effluent,
W74-04103 5D

SEWERAGE
Cleaning up a River,
W74-03968 5G

SHALLOW WATER
Cleaning up a River,
W74-03968 5G

Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2L

Wave Shoaling,
W74-04215 2E

Wave Shoaling,
W74-04216 2E

On the Breaking of Waves Arriving at an Angle to the Shore,
W74-04217 2H

SHEAR
Laminar and Axisymmetric Vertical Jets in a Stably Stratified Environment,
W74-04224 8B

SHEAR STRESS
Time Dependent Shear Stress Beneath a Shoaling Wave,
W74-04213 2J

SHELTERBELTS
Field Shelterbelt Afforestation and Greenery Planting,
W74-03883 3F

SHIPBOARD WASTE DISPOSAL
Cost Analysis of Optional Methods of Shipboard Domestic Waste Disposal,
W74-04115 5D

SHOALING
An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

SHOALING (WAVES)
Wave Shoaling,
W74-04215 2E

Wave Shoaling,
W74-04216 2E

SHOALS
Time Dependent Shear Stress Beneath a Shoaling Wave,
W74-04213 2J

SHORES
Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2L

SHRUBS
Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

Annual Increase of Aboveground Phytomass of Some Tundra Shrubs, (In Russian),
W74-04286 2I

SILICA
Silcretes and Associated Silica Diagenesis in Southern Africa and Australia,
W74-04067 2J

SIMULATION ANALYSIS
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

Process Control of Activated Sludge Treatment,
W74-03764 5D

Systems Simulation of Economic Factors and Their Relation to the Water System of Wyoming's Platte River Basin,
W74-03892 6A

Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

SKELETAL MUSCLE (FISH)
Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

SMALL WATERSHEDS
Sediment Production in a Small Appalachian Watershed During Spring Runoff: The Eaton Basin, 1970-1972,
W74-04267 2J

SNAKE LAKE (WIS)
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

SOCIAL ASPECTS
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

Some Models for the Economic Evaluation of the Environment,
W74-04083 5G

SOCIAL COSTS
Concepts of Externalities and Social Costs,
W74-03908 6B

SOCIAL DATA
A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

SOCIAL IMPACT
An Industrial Pollution Index,
W74-03889 5G

Concepts of Externalities and Social Costs,
W74-03908 6B

A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

SOCIAL NEEDS
A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

SOCIAL PARTICIPATION

SOCIAL PARTICIPATION
Water Resources and Social Choices,
W74-03951 6B

SOCIAL PSYCHOLOGY
A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

SOCIAL VALUES
Let's Enforce the Rules,
W74-03891 6E

Social Accounting Approaches to Water Resource Use in Economic Development.
W74-03907 6B

A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

SOCKEYE SALMON
Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

SODIUM CHLORIDE
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

SOIL ANALYSIS
Nitrate Determination by a Modified Conway Microdiffusion Method,
W74-03845 2G

SOIL CHEMISTRY
Gross Chemical Composition of Murgab Oasis Desertified and Ancient-Irrigation Soils (In Russian),
W74-04123 3C

SOIL CONSERVATION
Soil Conservation Districts.
W74-03998 6E

SOIL EROSION
Behavior of Cohesive Material From a Soil Engineer's Viewpoint,
W74-03798 2J

Upslope Erosion Analysis,
W74-03799 2J

SOIL FORMATION
Wind Erosion as a Factor in Soil Formation in the Pierre-Shale Landscape of Western South Dakota,
W74-03781 2J

SOIL MOISTURE
Integrated Measurement of Soil Moisture by Use of Radio Waves,
W74-03772 2C

The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

Investigation of the Dynamics of the Moisture State of the Soil Under Several Years of Forage Crops and Under Sainfoin, (In Czech),
W74-03917 3F

Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

Effect of Environmental Factors on Algae Count in the Main Soil Types of the Estonian SSR (In Estonian),
W74-04114 2G

Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

SOIL MOISTURE METERS
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

SOIL TESTS
Looking for Pollution Under the Earth,
W74-04004 5B

SOIL TREATMENT
Effect of Environmental Factors on Algae Count in the Main Soil Types of the Estonian SSR (In Estonian),
W74-04114 2G

SOIL TYPES
A Landscape Zonation for the Southern and Central Mackenzie River Valley Based on Terrain Permafrost Characteristics,
W74-04266 2C

SOIL WATER
An Experimental Study of Soil Water Flow Systems Involving Hysteresis,
W74-03760 2G

The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

SOIL WATER MOVEMENT
Evaluation of Water Flux Above a Deep Water Table Using Thermocouple Psychrometers,
W74-03776 2G

Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

Water Vapor Movement Through Mulches Under Field Conditions,
W74-03784 2G

Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

Effects of Deicing Chemicals Upon Ground and Surface Waters (Initial Program Development),
W74-04149 5B

SOIL-WATER-PLANT RELATIONSHIPS
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

SOILS
Appreciation of the Fitness for Utilization of the Soils of Provence,
W74-04125 2G

SOILS (SODIC)
Seasonal Variations of the Salinity in Some Profiles and in the Water Table of the Sodic Soils of Camargue: Preliminary Results (In French),
W74-04124 2G

SOLAR RADIATION
Simulation of the Energy Balance of a Greenhouse,
W74-04126 2I

The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

SOLID WASTES
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

SOLUBILITY
Stability Field Diagrams as Aids in Iron Chemistry Studies,
W74-04163 2K

SOLVENT EXTRACTIONS
A Solvent-Extraction Method for the Determination of Manganese-54 in Sea Water,
W74-03886 5A

SOUTH DAKOTA
Increasing Water Utilization Efficiency of a Pasture Grass by Increasing Aftermath Through Plant Selection,
W74-03773 3F

Wind Erosion as a Factor in Soil Formation in the Pierre-Shale Landscape of Western South Dakota,
W74-03781 2J

Statement of Progress on Investigation and Analysis of Flood Hydrographs from Small Drainage Basins in South Dakota,
W74-03821 4A

SOUTHWEST U
Arizona Indian Corn (Zea mays L.),
W74-03926 3F

SPACECRAFT WATER SYSTEMS
Water Recovery and Solid Waste Processing for Aerospace and Domestic Applications.
W74-04053 5D

SPATIAL DISTRIBUTION
Externalities, Environmental Pollution and Allocation in Space: A General Equilibrium Approach,
W74-04084 5G

SPAWNING
The Biology of Pike Perch in the Arnasaya Lakes System, (In Russian),
W74-03961 2H

Type of Spawning Grounds and Ecology of Spawning for Stint, Osmerus eperlanus (L.), in the Rybinsk Reservoir, (In Russian),
W74-04277 2H

SPAWNING GROUNDS
Water Supply in the Volga Basin and its Effect on Strugeon Reproduction, Family Acipenseridae Under Conditions of Natural and Regulated Flow, (In Russian),
W74-04279 8I

SPECIES DIVERSITY
Species Diversity of Chydorid Fossil Communities in the Mississippi Valley,
W74-03941 5C

SPECIFIC CAPACITY
Application of Engineering to Well Construction and Development at Vernon,
W74-04167 8B

SPECIFIC GRAVITY
Measuring Volumes of Sedimentary Grains,
W74-04056 2J

SPECTROPHOTOMETRY
Instrumental Parameters for Determination of Mercury by Flameless Atomic Absorption Spectrophotometry,
W74-03844 5A

Colorimetric Determination of Boron in Aqueous Solutions and in Borosilicate Glass by Solvent Extraction,
W74-03862 5A

Simultaneous Determination of Ferrocyanide and Ferricyanide in Aqueous Solutions Using Infrared Spectrometry,
W74-03866 5A

Application of the Carbon Cup Atomisation Technique in Water Analysis by Atomic-Absorption Spectroscopy,
W74-04073 5A

Spectrophotometric Determination of Hexachlorobutadiene (HCBD) in Soil and Water, (In Russian),
W74-04293 5B

SPECTROSCOPY
Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

SPIRITWOOD LAKE (N
Causes and Control of Algal Blooms in Spiritwood Lake, North Dakota,
W74-03906 5C

SPORES
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

SPORULATION
Effect of Weather Conditions on Sporulation of Helminothosporium turcicum Pass,
W74-04296 3F

SPRINKLER IRRIGATION
Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

ST
Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

STABILITY
Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

STANDING CROPS
Benthic Macroinvertebrate Diversity in Three Differentially Perturbed Michigan Streams,
W74-03905 5C

STATE GOVERNMENTS
Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

STATIC PRESSURE
A Method for Determining the Static Pressure of a Well from Buildup Data,
W74-04162 8G

STATISTICAL METHODS
Application of Statistical Methods in Hydrology (Primeneniye statisticheskikh metodov v gidrologii).
W74-03831 6B

A Systematic Approach to the Analysis of Means. Part II. Analysis of Contrasts. Part III. Analysis of Non-Normal Data,
W74-03837 7C

A Survey of Prediction Intervals and Their Applications,
W74-03858 7C

Lognormal Size Distribution of Particulate Matter,
W74-04058 2J

Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

Statistical Characteristics of Thunderstorms in Yakutsk Assr (Statisticheskiye kharakteristiki groz Yakutii),
W74-04253 2B

STATISTICS
Changes in Statistical Processing of Groundwater Level Measurements (Wandlungen bei der statistischen Aufbereitung von Grundwasserstandsmesswerten),
W74-04247 2F

Statistical Characteristics of Thunderstorms in Yakutsk Assr (Statisticheskiye kharakteristiki groz Yakutii),
W74-04253 2B

STATUTE
Eminent Domain.
W74-04020 6E

Offenses Concerning Public Roads and Navigable Waters.
W74-04029 6E

STINT
Type of Spawning Grounds and Ecology of Spawning for Stint, Osmerus eperlanus (L.), in the Rybinsk Reservoir, (In Russian),
W74-04277 2H

STOCHASTIC PROCESSES
Sequential Stochastic Optimization for Reservoir System,
W74-03914 4A

STORAGE TANKS
Management of Radioactive Aqueous Wastes from AEC Fuel-Reprocessing Operations,
W74-04188 5B

STORM DRAINS
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

The Characterization and Influence of Domestic Drain Effluents on the Red Cedar River,
W74-03895 5B

STORMS
Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

STRATIFICATION
Laminar and Axisymmetric Vertical Jets in a Stably Stratified Environment,
W74-04224 8B

STRATIFICATION (VERTICAL)
Preliminary Data About the Seasonal Changes and Vertical Stratification of Periphyton from the Middle Reach of the River Danube.
W74-04294 5A

STRATIGRAPHY
Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

STRATUS CLOUDS
Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2L

STREAM EROSION
On The Extent of Bottom Erosion in Large Rivers (Ueber den Umfang der Schlenerosion in grossen Gewaessern),
W74-04252 2J

STREAM FLOW
Conservation--Regulation of Streamflow.
W74-04016 6E

STREAM FLOW ALTERNATION
Conservation--Regulation of Streamflow.
W74-04016 6E

STREAM FLOW REGULATIONS
Conservation--Regulation of Streamflow.
W74-04016 6E

STREAMFLOW
Natural Mixing Processes in Rivers,
W74-03790 5B

STREAMFLOW

Annual Compilation and Analysis of Hydrologic Data for Elm Fork Trinity River, Trinity River Basin, Texas, 1971,
W74-03818 2E

A Reconnaissance of Streamflow and Fluvial Sediment Transport, Incline Village Area, Lake Tahoe, Nevada, Second Progress Report 1971,
W74-04050 2J

STREAMS
People V. Mack: A Sportsman's Definition of Navigability,
W74-03967 6E

STREAMS (DISORDERED)
Experiences with the Correction of Disordered Streams of the Alpine Type, (In Italian),
W74-04276 4D

STRONTIUM
Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

STRUCTURES
Petterson V. Froehlke (Challenge to Dredging Permit Issued by Corps of Engineers).
W74-03983 6E

STURGEON REPRODUCTION
Water Supply in the Volga Basin and its Effect on Strugeon Reproduction, Family Acipenseridae Under Conditions of Natural and Regulated Flow, (In Russian),
W74-04279 8I

SUBMARINE CANYONS
'Internal Waves' Advancing Along Submarine Canyons,
W74-04261 2E

SUBSURFACE IRRIGATION
Grain Sorghum Response to Trickle and Subserface Irrigation,
W74-04137 3F

SUGAR BEETS
A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

Weed Control in Sugar Beet Crops in the Kosovo Region, (In Serbo-Croatian),
W74-03943 3F

Chemical Changes in the Water and Accumulation Stratum of Soils in Ponds Fertilized with Beet-Sugar Factory Wastes,
W74-04110 5C

SULFIDE CONTROL
U-Tube Aeration,
W74-04046 5D

SULFIDES
Direct Determination of Sulfide by Rapid Direct Current Polarography,
W74-03865 2K

Absorptiometric Determination of Trace Amounts of Sulphide Ion in Water,
W74-04072 5A

SULFONATES
Column Partition Chromatographic Determination of Sodium Alkane Monosulfonates,
W74-03867 5A

SULFUROUS WATER
Bioecological Observations on Gambusia affinis Holbrooki Girard Living in Sulfurous, Warm and Brackish Waters (In Italian),
W74-04122 2I

SUNFISHES
Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

SUPPLEMENTAL IRRIGATION
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

SURF
Theoretical Study of Longshore Currents on a Plane Beach,
W74-04214 2E

SURF ZONE
Wave Shoaling,
W74-04216 2E

SURFACE-GROUNDWATER RELATIONSHIPS
Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

SURFACE WATERS
Water Resources of the New Jersey Part of the Ramapo River Basin,
W74-03806 4B

Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

Water Availability in Mobile County, Alabama,
W74-03811 4B

Chemical Quality of Surface Water in the Eastern Oswego River Basin, New York,
W74-03817 5A

Paasch V. Brown (Damages From Obstruction of Water Flow by Lower Landowner).
W74-04039 6E

A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

SURVEILLANCE
Environmental Surveillance at Hanford for CY-1970,
W74-04192 5B

SURVEILLANCE PROGRAM
Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

SURVEYS
Aerial Radiological Measuring Survey of the Area Surrounding the Monticello Nuclear Generating Plant, Monticello, Minnesota, August 1970.
W74-04185 5B

Aerial Radiological Measuring Survey of the Area Surrounding Big Rock Point Nuclear Plant, Big Rock Point, Michigan, 1968,
W74-04186 5B

SURVIVAL
Effect of Low Oxygen Concentration on Survival and Emergence of Aquatic Insects,
W74-04100 5C

SUSPENDED LOAD
Suspended-Sediment Sampling Variability,
W74-03801 2J

Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

The Influence of Suspended Particles on the Precipitation of Iron in Natural Waters,
W74-04272 5B

SUSPENDED SOLIDS
Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

SUSPENSION
The Structural-Continuum Theory of Dilute Suspensions of Rigid Ellipsoidal Particles,
W74-04249 8B

SUSQUEHANNA RIVER
The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

SWAMP ORE
Investigation of the Microflora of Swamp Ore and Lake Water by the Method of Electron Microscopy, (In Russian),
W74-04292 5A

SWAMP VEGETATION
Zonation of Aquatic and Swamp Vegetation, (In Rumanian),
W74-03843 2H

SWEDEN
Rotifer Plankton in Brackish and Freshwater Localities in Central Sweden,
W74-04041 5C

SWEDEN (GOTLAND)
Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

SYNCHAETA-GYRINA
Rotifer Plankton in Brackish and Freshwater Localities in Central Sweden,
W74-04041 5C

SYNTHESIS
The Relation Between the Synthesis of Inorganic Polyphosphate and Phosphate Uptake by Chlorella Vulgaris,
W74-04094 5C

SYSTEMATICS
Benthic Macroinvertebrate Diversity in Three Differentially Perturbed Michigan Streams,
W74-03905 5C

SYSTEMS ANALYSIS
The Optimal Expansion of a Water Resources Systems,
W74-03754 6A

The Pollution Sub-System,
W74-03964 6G

TANGIBLE BENEFITS
Externalities, Shadow Prices, and Benefit-Cost Calculations,
W74-03960 6B

TANZANIA
An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

TAXES
The Ground-Water Depletion Allowance Under the Federal Income Tax,
W74-03962 6E

TECHNOLOGICAL EXTERNALITIES
Opportunity Costs and Water Resource Use,
W74-03909 6B

TEMPERATURE
Effects of Temperature Change on Irrigation Rate in Arenicola marina (L.),
W74-04225 5C

The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

An Improved Mixing Length Theory of Turbulent Heat and Mass Transfer,
W74-04231 8B

Temperature Profiles for Turbulent Flow of High Prandtl Number Fluids,
W74-04232 8B

Transient Heat and Mass Transfer in Fully Developed Laminar Tube Flows,
W74-04237 8B

Regulation of Brain and Eye Temperatures by the Bluefin Tuna,
W74-04239 5C

Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

The Effect of Changes in Ambient Temperature on Spontaneous Activity in Skipjack Tuna,
W74-04241 5C

The Effect of Thermal Acclimation on Heart rate and Oxygen Consumption of Frogs During Submergence,
W74-04242 5A

Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

Seasonal Variation in Heart Rate Response to Core Temperature Changes,
W74-04244 5C

Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

TEMPORAL DISTRIBUTION
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

TENNESSEE
Soil Conservation Districts.
W74-03998 6E

TERRAIN ANALYSIS
A Landscape Zonation for the Southern and Central Mackenzie River Valley Based on Terrain Permafrost Characteristics,
W74-04266 2C

TERRITORIAL WATERS
Jurisdictional Problems Created by Artificial Islands.
W74-04022 6E

TESTING
Uncertainties in Hydrologic Models,
W74-03916 2A

TEXAS
Annual Compilation and Analysis of Hydrologic Data for Elm Fork Trinity River, Trinity River Basin, Texas, 1971,
W74-03818 2E

Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

TEXAS HIGH PLAINS
Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

TEXTILES
Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

THE NETHERLANDS
The Hydraulics of Artificial Recharge,
W74-03820 4B

THERMAL PLUME MAPPING
A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

THERMAL POLLUTION
Thermal Tolerances of Interior Alaskan Arctic Grayling (Thymallus arcticus),
W74-03759 5C

Evaluation of Thermal Pollution Control Alternatives,
W74-03791 5D

Mechanics of Heat Transfer in Nonstratified Open-Channel Flows,
W74-03792 5B

Heated Surface Discharges into Flowing Ambient Streams and Lakes,
W74-03794 5D

Fish Behavior Related to Thermal Pollution,
W74-03795 5C

Residual Information Model with Application to Heat from Thermal Power Plants,
W74-03911 5B

Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

Thermal Pollution and its Control,
W74-04234 5B

The Environmental and Regulatory Aspects of the Breeder Reactor,
W74-04238 5B

The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

THERMAL POWERPLANTS
Evaluation of Thermal Pollution Control Alternatives,
W74-03791 5D

THERMAL PROPERTIES
The Interaction of Water with Organic Solute Species,
W74-03762 1B

Thermal Interaction of two Streams in Boundary-Layer Flow Separated by a Plate,
W74-04236 8B

THERMAL STRATIFICATION
Fish Behavior Related to Thermal Pollution,
W74-03795 5C

THERMAL STRESS
Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

THERMAL TOLERANCE
Thermal Tolerances of Interior Alaskan Arctic Grayling (Thymallus arcticus),
W74-03759 5C

THERMOCCOUPLE PSYCHROMETERS
Evaluation of Water Flux Above a Deep Water Table Using Thermocouple Psychrometers,
W74-03776 2G

THERMOPHILIC FUNGI
Thermophilic Fungi in a Municipal Waste Compost System,
W74-03875 5A

THIRAM
Microbiological Determination of Thiram,
W74-03846 5A

THORNSCRUB
Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

THUNDERSTORMS
Statistical Characteristics of Thunderstorms in Yakutsk Assr (Statisticheskiye kharakteristiki groz Yakutii),
W74-04253 2B

TIDAL MARSHES
United States v. Cannon (Injunction Against Violation of Rivers and Harbors Act).
W74-04010 6E

Supratidal Environment and Geochemistry of Some Recent Dolomite Concretions, Broad Sound, Queensland, Australia,
W74-04069 2L

TIDAL WATERS
Hillsbourgh County Environmental Protection Commission v. Frandorson Properties (Deliberate Destruction of Mangroves in Tidal Waters Not Forbidden).
W74-03996 6E

TOTAL ORGANIC CARBON
Brave New World of TOC and TOD.
W74-03856 5A

TOTAL OXYGEN DEMAND
Brave New World of TOC and TOD.
W74-03856 5A

TOXICITY
Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

Chronic Toxicity of a Copper, Cadmium and Zinc Mixture to the Fathead Minnow (Pimephales promelas Rafinesque),
W74-03873 5C

Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

TRACE ELEMENTS
Selenium in Nebraska's Groundwater and Streams,
W74-03813 5B

Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

TRACE LEVELS
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

TRANS-ALASKA PIPELINE CORRIDOR
Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

TRANSPIRATION (TREES)
Some Causes of Failure in the Closeness of Correlative Connection Between Tree Species Transpiration and Meteorological Factors, (In Russian),
W74-04283 2D

TRANSPORTATION
Offenses Concerning Public Roads and Navigable Waters.
W74-04029 6E

TREATIES
The Ocean Dumping Convention--A Hopeful Beginning,
W74-04032 5G

TREATMENT FACILITIES
Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

Kentucky Pollution Abatement Authority.
W74-04002 6E

Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

TREE SPECIES
Some Causes of Failure in the Closeness of Correlative Connection Between Tree Species Transpiration and Meteorological Factors, (In Russian),
W74-04283 2D

TRIBONEMA
Yellow-Green Algae of Wastes, (In Ukranian),
W74-03919 5A

TRICKLE IRRIGATION
Grain Sorghum Response to Trickle and Subserface Irrigation,
W74-04137 3F

TRINITY RIVER BASIN (TEX)
Annual Compilation and Analysis of Hydrologic Data for Elm Fork Trinity River, Trinity River Basin, Texas, 1971,
W74-03818 2E

TRITIUM
Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

TROPHIC LEVEL
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

TROUT
Feeding and Food Relationships of the Trout Salmo ischchan Kessler and Whitefish Coregonus lavaretus Ludoga Poliakow of Lake Sevan, (In Russian),
W74-04203 2H

TRUCKEE RIVER BASIN (NEV)
A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

TSUNAMIS
The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

TUNA (BLUEFIN)
Regulation of Brain and Eye Temperatures by the Bluefin Tuna,
W74-04239 5C

TUNA (SKIPJACK)
The Effect of Changes in Ambient Temperature on Spontaneous Activity in Skipjack Tuna,
W74-04241 5C

TUNDRA SHRUBS
Annual Increase of Aboveground Phytomass of Some Tundra Shrubs, (In Russian),
W74-04286 2I

TURBULENT DIFFUSION
An Improved Mixing Length Theory of Turbulent Heat and Mass Transfer,
W74-04231 8B

TURBULENT FLOW
Investigation of the Velocity Structure in the Bottom Region of A Turbulent Wave Flow,
W74-04250 8B

TURF GRASSES
Irrigated Recreational Turfgrass with Sewage Effluent,
W74-03929 3C

TURKEY (ANATOLIA)
On Saltwater Hot Springs in the Coast Area of Western Anatolia, Turkey (Uber Salzwasser-Thermen Im Kustenland Von West-Anatolien, Turkei),
W74-04270 2F

TURTLES
Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

U
Friends of the Earth v. Armstrong (Environmental Protection Suit).
W74-04007 6E

UKRAINE
Harvest Qualities of Various Sizes of Hard Winter Wheat Seeds Under Irrigated Conditions in the Southern Steppes of the Ukraine, (In Russian),
W74-03915 3F

ULVA FASCIATA
Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

UMPQUA RIVER BASIN (OREG)
Flood Profiles in the Umpqua River Basin, Oregon, Part 2,
W74-03803 4A

UNDERGROUND WASTE DISPOSAL
The Future Prospects of Artificial Groundwater Recharge,
W74-03826 5D

The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

UNITED STATES
Safe Drinking Water Act of 1972--S.3994.
W74-04030 5G

UNIVERSAL SOIL-LOSS EQUATION
Upslope Erosion Analysis,
W74-03799 2J

UNSATURATED FLOW
Evaluation of Water Flux Above a Deep Water Table Using Thermocouple Psychrometers,
W74-03776 2G

UPWELLING
An Oceanographic Investigation of Thermal Changes in Monterey Bay, California, September 1971 - January 1972,
W74-04223 2L

URANIUM RADIOISOTOPES
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

URBAN RENEWAL
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

URBAN SOCIOLOGY
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

URBANIZATION
An Evaluation of Urban Flood Plains,
W74-03756 6F

Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

USSR
Application of Statistical Methods in Hydrology (Primeneniye statisticheskikh metodov v gidrologii).
W74-03831 6B

Quasi 2-year Variation in Runoff of USSR Rivers (Kvazidvukhletnyaya variatsiya v stoke rek SSSR),
W74-03834 2E

Data of Glaciological Studies. Chronicle and Discussions (Materialy glyatsiologicheskikh issledovaniy. Khronika, Obsuzhdeniya).
W74-03835 2C

Drought Resistance of Pear Varieties of the Main Ecological-Geographic Groups, (In Russian),
W74-04220 3F

USSR (AMU-DARYA FLOODPLAIN)
Structure and Productivity of the Phytomass of Gigantic Bunch-Forming Grasses in the Amu Darya Floodplain, (In Russian),
W74-04282 2I

USSR (AMUR RIVER BASIN)
Fecundity of the Grass Carp Ctenopharyngodon idella (Val.) in the Amur Basin (In Russian),
W74-04121 2I

USSR (ARMENIA)
Data on the Biology of Alburnus filippii Kessler Living in the Water Reserves of the Armenian SSR, (in Russian),
W74-03953 2I

USSR (ARNASAYA)
The Biology of Pike Perch in the Arnasaya Lakes System, (In Russian),
W74-03961 2H

USSR (AZERBAIDZHAN)
Accumulation of Root Mass in Perennial Legume Plots on Eroded Soils (In Azerbaidzhan),
W74-03874 3F

USSR (BOLSHOI KARABULAK LAKE)
The Mollusk Fauna of the Bolshoi Karabulak Oxbow Lake (Volga Delta), (In Russian),
W74-04165 2H

USSR (CISBAYKAL REGION)
Division of the Cisbaykal Region into Zones on the Basis of Moisture and Heat Availability (Rayonirovaniye territorii Predbaykal'ya po stepeni uvlazhneniya i teploobespechennosti),
W74-04254 2G

USSR (DNEPRODZERZHINSKOE RESERVOIR)
Proteolytic Activity of Saprophytic Microflora in the Dneprodzerzhinskoe Reservoir, (In Russian),
W74-03949 5C

USSR (DNIEPER RIVER)
Exchangeable Cations in Soils of the Dnieper Reservoirs,
W74-04255 2H

USSR (ESTONIAN-SSR)
Effect of Environmental Factors on Algae Count in the Main Soil Types of the Estonian SSR (In Estonian),
W74-04114 2G

USSR (FERGHANA BASIN)
Anti-Erosive Role of Natural Plants in Low Foot-Hills Bordering the Ferghana Basin, (In Russian),
W74-04287 4D

USSR (KAIRAKKUM RESERVOIR)
The Feeding of Carassius auratus gibelio Bloch. From Kairakkum Reservoir, (In Russian),
W74-04109 2H

USSR (KIEV RESERVOIR)
Organic Matter of the Soil in the Kiev Reservoir and its Role in the Development of Benthic Algae, (In Russian),
W74-04281 5C

USSR (KOMI ASSR)
Lakes of the Bol'shoy Patok River Basin (Northern Urals). Their Importance and Preservation (Ozera basseyna r. Bol'shoy Patok (Pripolyarnyy Ural), ikh znacheniye i okhrana).,
W74-03832 2H

USSR (LAKE BAIKAL)
Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

USSR (LAKE BALKHASH)
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

USSR (LAKE ILMEN)
Diet of the Mesocyclops leuckarti (Claus) and Leptodora kindtii (Focke) Populations in Lake Ilmen, (In Russian),
W74-04091 2H

USSR (LAKE SEVAN)
Feeding and Food Relationships of the Trout Salmo ischchan Kessler and Whitefish Coregonus lavaretus Ludoga Poliakow of Lake Sevan, (In Russian),
W74-04203 2H

USSR (MOZHAISK RESERVOIR)
Some Environmental Factors Determining the Primary Production of the Mozhaisk Reservoir, (In Russian),
W74-03939 5C

USSR (MURGAB OASIS)
Gross Chemical Composition of Murgab Oasis Desertified and Ancient-Irrigation Soils (In Russian),
W74-04123 3C

USSR (PAMIRS-ALAY MOUNTAINS)
A Map of Annual River Runoff in the Pamirs and Pamir-Alay Mountains (Karta godovogo stoka rek Pamira i Pamiro-Alaya),
W74-03836 2E

USSR (PRUT RIVER)
Primary Production of Phytoplankton and Destruction of Organic Matter in the Prut River, (In Russian),
W74-04284 5C

USSR (RYBINSK RESERVOIR)
Type of Spawning Grounds and Ecology of Spawning for Stint, Osmerus eperlanus (L.), in the Rybinsk Reservoir, (In Russian),
W74-04277 2H

USSR (SANZAR RIVER)
Species Composition of Fishes in the Sanzar River, (In Russian),
W74-03945 2I

USSR (SUKHANDAR'YA RIVER BASIN)
Closed Season Regulation for Table Fish in the Sukhandar'ya River Basin, (In Russian),
W74-04290 8I

USSR (TADZHIKISTAN)
Age Structure and Growth of Fish in Waters of Northern Tadzhikistan, (In Russian),
W74-04071 8I

USSR (URAL LAKES)
Experiment in Computing the Total Production of Zooplankton Using Ural Lakes as an Example (In Russian),
W74-04120 2H

USSR (VESELOVSK RESERVOIR)
Results of Acclimatization of Corophium sowinskyi (Mart.) in the Veselovsk Reservoir, (In Russian),
W74-04099 2H

USSR (VOLGA RIVER BASIN)
Water Supply in the Volga Basin and its Effect on Strugeon Reproduction, Family Acipenseridae Under Conditions of Natural and Regulated Flow, (In Russian),
W74-04279 8I

USSR (VOLOGDA OBLAST)
Iron Ore in Lakes of Vologda Oblast (Zhelezorudnyye ozera Vologodskoy oblasti),
W74-03833 2H

USSR (WESTERN TAIMYR)
Annual Increase of Aboveground Phytomass of Some Tundra Shrubs, (In Russian),
W74-04286 2I

USSR (YAKUTSK)
Statistical Characteristics of Thunderstorms in Yakutsk Assr (Statisticheskiye kharakteristiki groz Yakutii),
W74-04253 2B

UTAH
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

UTILITIES
Ohio v. Callaway (Injunction Action for Failure to Comply with Nepa).
W74-04009 6E

Water Sampling and Laboratory Service,
W74-04024 5A

Developments in Water Utility Law, 1972-1973, American Bar Association Review.
W74-04037 5G

Digital Computer Programs for the Cost Engineer.
W74-04087 5D

VALVATA-PISCINALIS
The Mollusk Fauna of the Bolshoi Karabulak Oxbow Lake (Volga Delta), (In Russian),
W74-04165 2H

VALVES
Automatic Control of Level, Pressure, and Flow,
W74-03861 8C

VARIABILITY
Quasi 2-year Variation in Runoff of USSR Rivers (Kvazidvukhletnyaya variatsiya v stoke rek SSSR),
W74-03834 2E

VEGETABLE CROPS
Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

Microflora of Nutrient Solution in Soilless Growing of Vegetable Crops, (In Russian),
W74-04235 3F

VEGETATION
Architecture of Riparian Forest Vegetation of Rivers and Creeks of French Guiana,
W74-04285 2I

VEGETATION EFFECTS
Flow Resistance over Short Simulated Vegetation and Various Tall Simulated Vegetation Groupings on Flow Resistance and Sediment Yield,
W74-03787 2E

Physical Effects of Maintaining Drainage Channels in North Carolina's Coastal Area,
W74-04075 2E

VEGETATION ESTABLISHMENT
Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

Anti-Erosive Role of Natural Plants in Low Foot-Hills Bordering the Ferghana Basin, (In Russian),
W74-04287 4D

VEGETATION REGROWTH
Increasing Water Utilization Efficiency of a Pasture Grass by Increasing Aftermath Through Plant Selection,
W74-03773 3F

VELOCITY
Investigation of the Velocity Structure in the Bottom Region of A Turbulent Wave Flow,
W74-04250 8B

VERMONT
Water Pollution Control.
W74-04015 6E

VERTICAL FRACTURES
Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

VERTICAL PERMEABILITY
New Single-Well Test for Determining Vertical Permeability,
W74-04150 8G

VIRGINIA
The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

VIRUSES (COXSACKIE B-3)
The Ability of Some Minerals to Adsorb Viruses from Water(In Ukrainian),
W74-03978 5F

VISCOUS FLOW
Self-Similar Solutions for a Three-Component Axisymmetrical Flow of a Viscous Fluid,
W74-04248 8B

VOLUME
Measuring Volumes of Sedimentary Grains,
W74-04056 2J

VOLUMETRIC ANALYSIS
Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXII. Symmetrical Periodic Current Differential Electrolytic Potentiometry in Oxidation - Reduction Titrimetry,
W74-03860 5A

WALL GROWTH
Mixed Culture Biooxidation of Phenol. II. Steady State Experiments in Continuous Culture,
W74-03880 5C

Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

WALLA WALLA RIVER BASIN
Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

WASHINGTON
Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

Environmental Surveillance at Hanford for CY-1970,
W74-04192 5B

Modern Sediments of Willapa Bay, Washington: A Coastal Plain Estuary,
W74-04209 2L

WASTE ASSIMILATIVE CAPACITY
Some Effects of Wastes on Natural Waters,
W74-03793 5B

Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

WASTE DISCHARGE
United States v. Tobin Packing Co. (Violation of Rivers and Harbors Act).
W74-04008 6E

WASTE DISPOSAL
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

Thermophilic Fungi in a Municipal Waste Compost System,
W74-03875 5A

Assault on a Lake,
W74-03975 5G

Developments in Water Utility Law, 1972-1973, American Bar Association Review.
W74-04037 5G

Cost Analysis of Optional Methods of Shipboard Domestic Waste Disposal,
W74-04115 5D

Management of Radioactive Aqueous Wastes from AEC Fuel-Reprocessing Operations,
W74-04188 5B

WASTE DISPOSAL WELLS
Wat's New in Deep-Well Injection,
W74-04265 5E

WASTE IDENTIFICATION
Environmental Applications of Advanced Instrumental Analyses: Assistance Projects, FY 72,
W74-04197 5A

WASTE STORAGE
Management of Radioactive Aqueous Wastes from AEC Fuel-Reprocessing Operations,
W74-04188 5B

WASTE TREATMENT
Levels of Assessment,
W74-04035 6B

Chemical Changes in the Water and Accumulation Stratum of Soils in Ponds Fertilized with Beet-Sugar Factory Wastes,
W74-04110 5C

Management of Radioactive Aqueous Wastes from AEC Fuel-Reprocessing Operations,
W74-04188 5B

WASTE WATER DISPOSAL
Water Pollution Control.
W74-04015 6E

Wat's New in Deep-Well Injection,
W74-04265 5E

WASTE WATER (POLLUTION)
Treatment of Oily and Metal-Containing Wastewater,
W74-03852 5B

WASTE WATER TREATMENT
Process Control of Activated Sludge Treatment,
W74-03764 5D

Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

Groundwater Recharge for Waste Water Reclamation and/or Storage of Supplies: A Cost Comparison with Conventional Methods,
W74-03825 5D

The Future Prospects of Artificial Groundwater Recharge,
W74-03826 5D

Occupationally Related Health Hazards in Wastewater Treatment Systems,
W74-03853 5C

Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

Department of Natural Resources--Water Resource.
W74-04005 6E

Industrial Water Pollution Control--An Overview,
W74-04028 5D

Water Renovation for Unrestricted Re-Use,
W74-04034 5D

Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

U-Tube Aeration,
W74-04046 5D

Water Recovery and Solid Waste Processing for Aerospace and Domestic Applications.
W74-04053 5D

Digital Computer Programs for the Cost Engineer.
W74-04087 5D

Cost Analysis of Optional Methods of Shipboard Domestic Waste Disposal,
W74-04115 5D

Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

Waste Water Impurity Level Affects Flocculation Efficiency of Polyelectrolytes,
W74-04195 5D

WASTES
Residual Information Model with Application to Heat from Thermal Power Plants,
W74-03911 5B

WATER
Catastrophe Brewing in Quiet Waters,
W74-04025 5B

WATER ANALYSIS
Selenium in Nebraska's Groundwater and Streams,
W74-03813 5B

Instrumental Parameters for Determination of Mercury by Flameless Atomic Absorption Spectrophotometry,
W74-03844 5A

Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

Improvements in the Wet Oxidation-Dithizone Method for Determining Low Mercury Levels in Food,
W74-03869 5A

A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

Absorptiometric Determination of Trace Amounts of Sulphide Ion in Water,
W74-04072 5A

Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

WATER BALANCE
Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

Water Renovation for Unrestricted Re-Use,
W74-04034 5D

The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

WATER CHEMISTRY
The Chemistry of Cadmium in Natural Water--I: A Study of Cadmium Complex Formation Using the Cadmium Specific-Ion Electrode,
W74-03775 5B

Selenium in Nebraska's Groundwater and Streams,
W74-03813 5B

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part II: Water Chemistry and Sediment Analyses,
W74-03933 5C

Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments.
W74-04268 2K

Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

WATER CIRCULATION
Development of Three-Dimensional Numerical Models of the Great Lakes,
W74-04051 2H

On Saltwater Hot Springs in the Coast Area of Western Anatolia, Turkey (Uber Salzwasser-Thermen Im Kustenland Von West-Anatolien, Turkei),
W74-04270 2F

Some Physical and Chemical Properties of the Gulf of Corinth,
W74-04273 2L

WATER CONSERVATION
Conservation, Geology and Water Resources,
W74-04013 6E

Florida Water Resources Act of 1972.
W74-04019 6A

Water Renovation for Unrestricted Re-Use,
W74-04034 5D

Water Commission Endorses User Pay Concept,
W74-04036 6E

WATER CONSUMPTION
Alternative Futures Using the Wollman-Bonem Models,
W74-03888 6A

WATER CONTROL
Ohio v. Callaway (Injunction Action for Failure to Comply with Nepa).
W74-04009 6E

Water Commission Endorses User Pay Concept,
W74-04036 6E

WATER COSTS
Cost Analysis of Groundwater Supplies in the North Atlantic Region, 1970,
W74-03815 4B

The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

WATER DEMAND
An Application Study in Water Distribution Control,
W74-03755 8C

Alternative Futures Using the Wollman-Bonem Models,
W74-03888 6A

Some Data on the Water Economy and the Utilization of Water Resources in Bulgaria, Including Irrigation,
W74-03954 3F

WATER DEVELOPMENT
Water Commission Endorses User Pay Concept,
W74-04036 6E

WATER DISTRIBUTION (APPLIED)
An Application Study in Water Distribution Control,
W74-03755 8C

WATER HARVESTING
Lower Cost Water Harvesting Methods,
W74-03952 3B

WATER LAW
The Ground-Water Depletion Allowance Under the Federal Income Tax,
W74-03962 6E

Water Resources.
W74-03980 6E

Canals and Waterways.
W74-03990 6E

Soil Conservation Districts.
W74-03998 6E

Water Pollution Control.
W74-04015 6E

Conservation--Regulation of Streamflow.
W74-04016 6E

Florida Water Resources Act of 1972.
W74-04019 6A

Developments in Water Utility Law, 1972-1973, American Bar Association Review.
W74-04037 5G

WATER LEVEL FLUCTUATIONS
Water-Level Declines and Ground-Water Quality, Upper Black Squirrel Creek Basin, Colorado,
W74-03808 4B

Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

WATER LEVELS
Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

Development of Three-Dimensional Numerical Models of the Great Lakes,
W74-04051 2H

Changes in Statistical Processing of Groundwater Level Measurements (Wandlungen bei der statistischen Aufbereitung von Grundwasserstandsmesswerten),
W74-04247 2F

WATER LOSS
A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

A Bill to Authorize Extensions of the American Canal at El Paso, Texas.
W74-03986 6E

WATER MANAGEMENT (APPLIED)
Water Resource Commission.
W74-03969 6E

WATER POLICY
The Optimal Expansion of a Water Resources Systems,
W74-03754 6A

WATER POLLUTION
Test for Anticholinesterase Materials in Water,
W74-03838 5A

Water Pollution.
W74-03972 6E

Disclosure of Unlawful Oil Discharge Provides Immunity from Prosecution,
W74-03989 5G

Kentucky Pollution Abatement Authority.
W74-04002 6E

Looking for Pollution Under the Earth,
W74-04004 5B

Planning and Zoning-Land Subdivisions.
W74-04006 6E

Catastrophe Brewing in Quiet Waters,
W74-04025 5B

Industrial Water Pollution Control--An Overview,
W74-04028 5D

The Ocean Dumping Convention--A Hopeful Beginning,
W74-04032 5G

Environmental Surveillance at Hanford for CY-1970,
W74-04192 5B

Protection of Saprophytes as the Main Factor in a Program for Protection of Water Environments. (In Polish),
W74-04297 5G

WATER POLLUTION CONTROL
The Effects of Artificial Sunlight Upon Floating Oils,
W74-03777 5B

Evaluation of Thermal Pollution Control Alternatives,
W74-03791 5D

Some Effects of Wastes on Natural Waters,
W74-03793 5B

Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

Water Resources.
W74-03980 6E

Iowa Water Pollution Control Commission V. Town of Paton (Authority to Compel Town to Change its Sewage System).
W74-03985 6E

Hillsbourgh County Environmental Protection Commission v. Frandorson Properties (Deliberate Destruction of Mangroves in Tidal Waters Not Forbidden).
W74-03996 6E

Littering of Property and Waters.
W74-04017 6E

Supervision of Oil, Gas, and Natural Dry Gas Wells.
W74-04018 6E

Fabric Boom Concept for Containment and Collection of Floating Oil.
W74-04044 5G

Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

WATER POLLUTION EFFECTS
Fish Behavior Related to Thermal Pollution,
W74-03795 5C

Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

The Economic Impact of the Ban on Commercial Fishing on Lake Pickwick,
W74-03910 6B

Regional Interdependencies and External Diseconomies,
W74-03912 6B

Radiation Reaction of the Adenohypophysis-Gonads System in Cold-Blooded Animals,
W74-04180 5C

Natural Radiation Loads on the Eggs of Marine and Fresh Water Organisms,
W74-04182 5C

Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

WATER POLLUTION (LITTER)
Littering of Property and Waters.
W74-04017 6E

WATER POLLUTION SOURCES
The Chemistry of Cadmium in Natural Water--I: A Study of Cadmium Complex Formation Using the Cadmium Specific-Ion Electrode,
W74-03775 5B

Agricultural Impact on Water Quality in Western Rivers,
W74-03796 5B

Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

Selenium in Nebraska's Groundwater and Streams,
W74-03813 5B

Treatment of Oily and Metal-Containing Wastewater,
W74-03852 5B

Identifying Source of Petroleum by Infrared Spectroscopy,
W74-03854 5A

Mercury: Uptake by the Goldfish, Carassius auratus, from Low Concentrations in Water and Its Tissue Distribution,
W74-03898 5C

Water Pollution.
W74-03972 6E

Portland Pipe Line Corporation V. Environmental Improvement Commission (Constitutionality of a State Statute).
W74-03988 6E

Catastrophe Brewing in Quiet Waters,
W74-04025 5B

Effects on Water Quality in the Shallow Aquifer due to the Operation of the Cross State Dump, Palm Beach County, Florida,
W74-04052 5B

Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

Environmental Surveillance at Hanford for CY-1970,
W74-04192 5B

Environmental Applications of Advanced Instrumental Analyses: Assistance Projects, FY 72,
W74-04197 5A

Water Quality Cycle--Reflection of Activities of Nature and Man,
W74-04263 5B

WATER PRODUCTION FUNCTIONS
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

WATER QUALITY
Alaska Water Resources Research Needs for the 70's.
W74-03757 6B

Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

Chemical and Biological Survey of the Savannah River Adjacent to Elba Island,
W74-03804 5B

Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

Water-Level Declines and Ground-Water Quality, Upper Black Squirrel Creek Basin, Colorado,
W74-03808 4B

Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

Water Availability in Mobile County, Alabama,
W74-03811 4B

Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

Chemical Quality of Surface Water in the Eastern Oswego River Basin, New York,
W74-03817 5A

Borehole Recharge: The Compatability of Recharge Water With the Aquifer,
W74-03822 4B

Clogging in Recharge Wells, Causes and Cures,
W74-03824 4B

In-Plant Biological Monitoring,
W74-03855 5A

Mercury: Uptake by the Goldfish, Carassius auratus, from Low Concentrations in Water and Its Tissue Distribution,
W74-03898 5C

Water Resources.
W74-03980 6E

United States v. Tobin Packing Co. (Violation of Rivers and Harbors Act).
W74-04008 6E

A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

Effects on Water Quality in the Shallow Aquifer due to the Operation of the Cross State Dump, Palm Beach County, Florida,
W74-04052 5B

Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

Effects of Deicing Chemicals Upon Ground and Surface Waters (Initial Program Development),
W74-04149 5B

Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California),
W74-04274 7C

Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

WATER QUALITY ACT
The Future of Water Quality Control,
W74-04026 5G

WATER QUALITY CONTROL
Summary Report of the Agreed Monitoring Projects on Eutrophication of Waters.
W74-03940 5C

Department of Natural Resources--Water Resource.
W74-04005 6E

Effects of the Feeder Canal on the Water Resources of the Fort Lauderdale Prospect Well-Field Area,
W74-04259 5G

WATER QUALITY CYCLE
Water Quality Cycle--Reflection of Activities of Nature and Man,
W74-04263 5B

WATER QUALITY IMPROVEMENT ACT
Disclosure of Unlawful Oil Discharge Provides Immunity from Prosecution,
W74-03989 5G

WATER QUALITY STANDARDS
The Future of Water Quality Control,
W74-04026 5G

Safe Drinking Water Act of 1972--S.3994.
W74-04030 5G

Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

WATER RATES
A New Approach to Domestic Water Rating,
W74-03963 6C

WATER RESOURCE DEVELOPMENT
Study of Water Resources and Management.
W74-03970 6E

Levels of Assessment.
W74-04035 6B

WATER RESOURCE PLANNING
Department of Natural Resources--Water Resource.
W74-04005 6E

Levels of Assessment.
W74-04035 6B

Water Commission Endorses User Pay Concept,
W74-04036 6E

WATER RESOURCES
Water Resources Newsletter, June 1973.
W74-03774 4A

Water Resources of the New Jersey Part of the Ramapo River Basin.
W74-03806 4B

Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

Water Availability in Mobile County, Alabama,
W74-03811 4B

Opportunity Costs and Water Resource Use,
W74-03909 6B

Water Resource Commission.
W74-03969 6E

Water Resources.
W74-03980 6E

Kentucky Pollution Abatement Authority.
W74-04002 6E

A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

WATER RESOURCES DEVELOPMENT
Water Resources of the New Jersey Part of the Ramapo River Basin,
W74-03806 4B

Water Resource Commission.
W74-03969 6E

Conservation, Geology and Water Resources,
W74-04013 6E

Water-Supply Planning in Developing Countries,
W74-04117 6A

WATER RESOURCES RESEARCH ACT
Study of Water Resources and Management.
W74-03970 6E

WATER REUSE

WATER REUSE
Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

Groundwater Recharge for Waste Water Reclamation and/or Storage of Supplies: A Cost Comparison with Conventional Methods,
W74-03825 5D

The Future Prospects of Artificial Groundwater Recharge,
W74-03826 5D

Water Renovation for Unrestricted Re-Use,
W74-04034 5D

Water Recovery and Solid Waste Processing for Aerospace and Domestic Applications.
W74-04053 5D

WATER RIGHTS
The Ground-Water Depletion Allowance Under the Federal Income Tax,
W74-03962 6E

Private Rights in Waters.
W74-03973 6E

Water Commission Endorses User Pay Concept,
W74-04036 6E

WATER SAMPLING
Water Sampling and Laboratory Service,
W74-04024 5A

Loss of Mercury from Water During Storage,
W74-04048 5A

WATER SPREADING
The Hydraulics of Artificial Recharge,
W74-03820 4B

WATER STORAGE
Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

WATER SUPPLY
Cost Analysis of Groundwater Supplies in the North Atlantic Region, 1970,
W74-03815 4B

Village of Cornwall v. Environmental Protection Administration of the City of New York (Approval Sought for Interconnection with Aqueduct).
W74-03995 5G

Eminent Domain.
W74-04020 6E

Water Sampling and Laboratory Service,
W74-04024 5A

Water Recovery and Solid Waste Processing for Aerospace and Domestic Applications.
W74-04053 5D

Water-Supply Planning in Developing Countries,
W74-04117 6A

Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

WATER SUPPLY DEVELOPMENT
Lower Cost Water Harvesting Methods,
W74-03952 3B

Discharge System for the A.D. Edmonston Pumping Plant,
W74-04038 3B

WATER TABLE
Changes in Statistical Processing of Groundwater Level Measurements (Wandlungen bei der statistischen Aufbereitung von Grundwasserstandsmesswerten),
W74-04247 2F

WATER TEMPERATURE
Chemical and Biological Survey of the Savannah River Adjacent to Elba Island,
W74-03804 5B

Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

Montezuma Well, Arizona, as a Habitat,
W74-03925 2H

Development of Three-Dimensional Numerical Models of the Great Lakes,
W74-04051 2H

An Oceanographic Investigation of Thermal Changes in Monterey Bay, California, September 1971 - January 1972,
W74-04223 2L

Effects of Temperature Change on Irrigation Rate in Arenicola marina (L.),
W74-04225 5C

Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

Temperature and Phytoplankton Growth in the Sea,
W74-04233 5C

The Effect of Changes in Ambient Temperature on Spontaneous Activity in Skipjack Tuna,
W74-04241 5C

The Effect of Thermal Acclimation on Heart rate and Oxygen Consumption of Frogs During Submergence,
W74-04242 5A

WATER TRANSFER
Village of Cornwall v. Environmental Protection Administration of the City of New York (Approval Sought for Interconnection with Aqueduct).
W74-03995 5G

WATER TREATMENT
The Effectiveness of Sand Filters for the Removal of Colloidal Manganese Oxides from Water Using Selected Cations as Filter Aids,
W74-03893 5F

The Ability of Some Minerals to Adsorb Viruses from Water(In Ukrainian),
W74-03978 5F

The Application of Fundamental Limnological Research in Water Supply System Design and Management,
W74-04111 5C

The 'Tenacious' Iron Bacteria,
W74-04143 5B

Corrosion and its Prevention in Waters,
W74-04151 8G

WATER UTILIZATION
Increasing Water Utilization Efficiency of a Pasture Grass by Increasing Aftermath Through Plant Selection,
W74-03773 3F

Social Accounting Approaches to Water Resource Use in Economic Development.
W74-03907 6B

Opportunity Costs and Water Resource Use.
W74-03909 6B

Regional Interdependencies and External Diseconomies,
W74-03912 6B

Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

Alfalfa Quality: Is There a Difference,
W74-03930 3F

Some Data on the Water Economy and the Utilization of Water Resources in Bulgaria, Including Irrigation,
W74-03954 3F

Levels of Assessment,
W74-04035 6B

WATER WELLS
Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

WATER WORKS
The Application of Fundamental Limnological Research in Water Supply System Design and Management,
W74-04111 5C

WATER YIELD
Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

WATER YIELD IMPROVEMENT
Lower Cost Water Harvesting Methods,
W74-03952 3B

WAVE SPECTRA
Wave Shoaling,
W74-04216 2E

WAVES (WATER)
Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

The Threshold of Sediment Movement Under Oscillatory Water Waves,
W74-04065 2J

Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

Time Dependent Shear Stress Beneath a Shoaling Wave,
W74-04213 2J

Wave Shoaling,
W74-04215 2E

Wave Shoaling,
W74-04216 2E

On the Breaking of Waves Arriving at an Angle to the Shore,
W74-04217 2H

Investigation of the Velocity Structure in the Bottom Region of A Turbulent Wave Flow,
W74-04250 8B

WEATHER FORECASTING
Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

WEATHER PATTERNS
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

WEATHERING
Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

WEED CONTROL
Weed Control in Sugar Beet Crops in the Kosovo Region, (In Serbo-Croatian),
W74-03943 3F

WEIRS
Aeration at Weirs.
W74-04113 5C

WELFARE (ECONOMICS)
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

Opportunity Costs and Water Resource Use,
W74-03909 6B

Common Property, Congestion, and Environmental Pollution,
W74-03958 6G

Accounting for Pollution: Pollution Abatement and the National Product,
W74-03959 5G

Economic and Social Projects with Environmental Repercussions: A Shadow Project Approach,
W74-04085 6B

WELL PERMITS
Supervision of Oil, Gas, and Natural Dry Gas Wells.
W74-04018 6E

WELL REGULATIONS
Supervision of Oil, Gas, and Natural Dry Gas Wells.
W74-04018 6E

WELLS
The 'Tenacious' Iron Bacteria,
W74-04143 5B

A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

New Single-Well Test for Determining Vertical Permeability,
W74-04150 8G

Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

A Method for Determining the Static Pressure of a Well from Buildup Data,
W74-04162 8G

Well Grouting and Well Protection,
W74-04164 8F

Application of Engineering to Well Construction and Development at Vernon,
W74-04167 8B

A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

WEST BASIN LAKE (AUSTRALIA)
A Meromictic Lake in Australia,
W74-04101 5C

WEST VIRGINIA
Problems in Phenolics-Modeling Methods in the Ohio River at Wheeling, W. Va.,
W74-03849 5A

WESTERN LAKE ERIE
An Ecological Evaluation of a Thermal Discharge. Part II: The Distribution of Phytoplankton and Primary Productivity Near the Western Shore of Lake Erie,
W74-03936 5C

An Ecological Evaluation of a Thermal Discharge. Part III: The Distribution of Zooplankton Along the Western Shore of Lake Erie,
W74-04095 5C

WETLANDS
Supervision of Dams and Reservoirs.
W74-03999 6E

United States v. Cannon (Injunction Against Violation of Rivers and Harbors Act).
W74-04010 6E

WHEAT
Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

WHEAT SEEDS
Harvest Qualities of Various Sizes of Hard Winter Wheat Seeds Under Irrigated Conditions in the Southern Steppes of the Ukraine, (In Russian),
W74-03915 3F

WHITE BREAM
Dependence of the Growth of White Bream and Goldfish on Environment, (In Byelorussiau),
W74-04090 2H

WHITEFISH
Feeding and Food Relationships of the Trout Salmo ischchan Kessler and Whitefish Coregonus lavaretus Ludoga Poliakow of Lake Sevan, (In Russian),
W74-04203 2H

WILLAMETTE RIVER BASIN (ORE)
Indications of Streambed Degradation in the Willamette Valley,
W74-03770 2J

WIND EROSION
Wind Erosion as a Factor in Soil Formation in the Pierre-Shale Landscape of Western South Dakota,
W74-03781 2J

Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

WIND TIDES
On Wind Tides and Longshore Currents Over the Continental Shelf Due to Winds Blowing at an Angle to the Coast,
W74-04210 2E

WIND TUNNEL TESTS
Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

WIND VELOCITY
Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

WIND WAVES
The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

WINDS
Internal Geometry and Origin of Vegetated Coastal Sand Dunes,
W74-04061 2J

The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

WINDSTORMS
Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

WINTER
Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

WISCONSIN
Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience,
W74-03965 6B

WISCONSIN

Department of Natural Resources--Water Resource.
W74-04005 6E

Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

WOLLMAN-BONEM MODEL
Alternative Futures Using the Wollman-Bonem Models,
W74-03888 6A

WORMS
Effects of Temperature Change on Irrigation Rate in Arenicola marina (L.),
W74-04225 5C

WYOMING
Systems Simulation of Economic Factors and Their Relation to the Water System of Wyoming's Platte River Basin,
W74-03892 6A

The Effectiveness of Sand Filters for the Removal of Colloidal Manganese Oxides from Water Using Selected Cations as Filter Aids,
W74-03893 5F

X-RAYS
Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

YTTRIUM
Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

YUGOSLAVIA (APATIN)
The Inundation Region of the Danube, Km 1402,
W74-04080 2K

YUGOSLAVIA (KOSOVO REGION)
Weed Control in Sugar Beet Crops in the Kosovo Region, (In Serbo-Croatian),
W74-03943 3F

ZINC
Chronic Toxicity of a Copper, Cadmium and Zinc Mixture to the Fathead Minnow (Pimephales promelas Rafinesque),
W74-03873 5C

ZONATION
Zonation of Aquatic and Swamp Vegetation, (In Rumanian),
W74-03843 2H

ZOOPLANKTON
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

An Analysis of the Zooplankton Community in an Acid Polluted Reservoir,
W74-03938 5C

An Ecological Evaluation of a Thermal Discharge. Part III: The Distribution of Zooplankton Along the Western Shore of Lake Erie,
W74-04095 5C

Experiment in Computing the Total Production of Zooplankton Using Ural Lakes as an Example (In Russian),
W74-04120 2H

AUTHOR INDEX

ABRAMS, M.
Thermal Interaction of two Streams in Boundary-Layer Flow Separated by a Plate,
W74-04236 8B

AGUADO, E.
Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

AITCHISON, P. A.
The Relation Between the Synthesis of Inorganic Polyphosphate and Phosphate Uptake by Chlorella Vulgaris,
W74-04094 5C

AL-HUSSAINY, R.
A Method for Determining the Static Pressure of a Well from Buildup Data,
W74-04162 8G

AL-SIBAAI, A. A.
Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

ALEKPEROV, K. A.
Accumulation of Root Mass in Perennial Legume Plots on Eroded Soils (In Azerbaidzhan),
W74-03874 3F

ALFORD, A. L.
Environmental Applications of Advanced Instrumental Analyses: Assistance Projects, FY 72,
W74-04197 5A

ALI, W. R.
Column Partition Chromatographic Determination of Sodium Alkane Monosulfonates,
W74-03867 5A

ANDERSON, D. M.
The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

ANDERSON, J. J.
Some Physical and Chemical Properties of the Gulf of Corinth,
W74-04273 2L

ANDERSON, K. K.
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

ANDREWS, R. S.
Modern Sediments of Willapa Bay, Washington: A Coastal Plain Estuary,
W74-04209 2L

ARANBAEV, M. P.
Gross Chemical Composition of Murgab Oasis Desertified and Ancient-Irrigation Soils (In Russian),
W74-04123 3C

AREHART-TREICHEL, J.
Oil on the Waters: Modest Progress in Cleanup Technology,
W74-03979 5G

ASHCROFT, G. L.
Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

ASTON, S. R.
The Influence of Suspended Particles on the Precipitation of Iron in Natural Waters,
W74-04272 5B

AVIL'TSEVA, N. V.
Effect of Artificial Water Aeration on Basin Algal Flora, (In Russian),
W74-03918 5C

AZIMOV, KH.
Anti-Erosive Role of Natural Plants in Low Foot-Hills Bordering the Ferghana Basin, (In Russian),
W74-04287 4D

BABAKULYEV, D. KH.
Hygienic Evaluation of a Machine for Applying Granulated Herbicides in Canals of the Collector-Drainage Network, (In Russian),
W74-04166 5G

BABCOCK, K. L.
Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

BAGLEY, E. W.
The Ground-Water Depletion Allowance Under the Federal Income Tax,
W74-03962 6E

BAILEY, B. L.
Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

BAKER, D. H. III.
Mercury: Uptake by the Goldfish, Carassius auratus, from Low Concentrations in Water and Its Tissue Distribution,
W74-03898 5C

BAKER, M. M.
Concepts of Externalities and Social Costs,
W74-03908 6B

Regional Interdependencies and External Diseconomies,
W74-03912 6B

Residual Information Model with Application to Heat from Thermal Power Plants,
W74-03911 5B

BALTIMORE, H. E.
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

BANIN, A.
The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

BARFIELD, B. J.
Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

BARKER, R. A.
Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

BARRY, W. T.
Montezuma Well, Arizona, as a Habitat,
W74-03925 2H

BARTON, C. J.
Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

BATES, J. M.
Ohio Mussel Fisheries Investigation. Part I: Mussel Studies,
W74-03932 8I

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part II: Water Chemistry and Sediment Analyses,
W74-03933 5C

Ohio Mussel Fisheries Investigation. Part III: Plankton Survey,
W74-03934 5C

BAUDOUIN, M. F.
Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

BAUR, S.
Microbiological Determination of Thiram,
W74-03846 5A

BECKER, L. D.
Statement of Progress on Investigation and Analysis of Flood Hydrographs from Small Drainage Basins in South Dakota,
W74-03821 4A

BELL, D. T.
Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses.
W74-04127 3F

BENAYOUN, G.
Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

BENNETT, J. P.
Suspended-Sediment Sampling Variability,
W74-03801 2J

BERKIN, N. S.
Division of the Cisbaykal Region into Zones on the Basis of Moisture and Heat Availability (Rayonirovaniye territorii Predbaykal'ya po stepeni uvlazhneniya i teploobespechennosti),
W74-04254 2G

BERMAN, T.
Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

BERRIE, A. D.
Productivity of the River Thames at Reading,
W74-04093 5C

BESANT, R. W.
Transient Heat and Mass Transfer in Fully Developed Laminar Tube Flows,
W74-04237 8B

BESSET, P.
A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

BETANCOURT, O. J.
Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

BEZEMER, C.
Filtration Behavior of Circulating Drilling Fluids,
W74-04141 8B

BIBLE, J. L.
An Analysis of the Zooplankton Community in an Acid Polluted Reservoir,
W74-03938 5C

BILLINGS, G. K.
The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments,
W74-04268 2K

BINGHAM, D. L.
Water-Level Declines and Ground-Water Quality, Upper Black Squirrel Creek Basin, Colorado,
W74-03808 4B

BISHOP, E.
Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXI. Introduction and Instrumentation,
W74-03859 5A

Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXII. Symmetrical Periodic Current Differential Electrolytic Potentiometry in Oxidation - Reduction Titrimetry,
W74-03860 5A

BIXBY, H. L. JR.
Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

BLACK, A. O.
Disclosure of Unlawful Oil Discharge Provides Immunity from Prosecution,
W74-03989 5G

BLACKSTONE, J. H. JR.
Concepts of Externalities and Social Costs,
W74-03908 6B

BLENCH, T.
Regime Problems of Rivers Formed in Sediment,
W74-03789 2J

BLOODGOOD, D. E.
Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

BOBRO, V. I.
Some Causes of Failure in the Closeness of Correlative Connection Between Tree Species Transpiration and Meteorological Factors, (In Russian),
W74-04283 2D

BOGUCHWAL, L. A.
Flume Experiments on the Transition from Ripples to Lower Flat Bed with Increasing Sand Size,
W74-04063 2J

BOLCH, W. E.
Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

BOLUS, R. L.
The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

BONZ, P. E.
Fabric Boom Concept for Containment and Collection of Floating Oil,
W74-04044 5G

BOONKIRD, V. S.
Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

BORGSTROM, R. E.
Cost Analysis of Optional Methods of Shipboard Domestic Waste Disposal,
W74-04115 5D

BORN, S. M.
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

BOUWER, H.
Wat's New in Deep-Well Injection,
W74-04265 5E

BOWEN, A. J.
Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

BOZRIKOV, VI. V.
Field Shelterbelt Afforestation and Greenery Planting,
W74-03883 3F

BRETSCHNEIDER, C. L.
On Wind Tides and Longshore Currents Over the Continental Shelf Due to Winds Blowing at an Angle to the Coast,
W74-04210 2E

BRETT, R. W. J.
Process Control of Activated Sludge Treatment,
W74-03764 5D

BRETTUM, P.
Algae from Some Lakes in Nordmarka Near Oslo,
W74-04289 2H

BRINKMANN, R.
On Saltwater Hot Springs in the Coast Area of Western Anatolia, Turkey (Uber Salzwasser-Thermen Im Kustenland Von West-Anatolien, Turkei),
W74-04270 2F

BROGAN, D. R.
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

BROOKS, R. R.
Instrumental Parameters for Determination of Mercury by Flameless Atomic Absorption Spectrophotometry,
W74-03844 5A

BROOKSBANK, P.
Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

BROTAK, E. A.
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

BROWN, C. W.
Identifying Source of Petroleum by Infrared Spectroscopy,
W74-03854 5A

BROWN, K. W.
A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

BROWN, R. F.
Clogging in Recharge Wells, Causes and Cures,
W74-03824 4B

BUBELA, B.
Apparatus for Studies of Artificial Sediments,
W74-04057 2J

BURKE, R. III
Water Resources and Social Choices,
W74-03951 6B

BURNHAM, A. K.
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

BURNS, W. A. JR.
New Single-Well Test for Determining Vertical Permeability,
W74-04150 8G

BURROWS, W. D.
Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

BURWELL, R. E.
Nitrogen and Phosphorus Losses in Surface Runoff from Agricultural Land as Influenced by Placement of Broadcast Fertilizer,
W74-04096 5C

BURYI, V. S.
Hygienic Evaluation of a Machine for Applying Granulated Herbicides in Canals of the Collector-Drainage Network, (In Russian),
W74-04166 5G

BUTLER, G.
Corrosion and its Prevention in Waters,
W74-04151 8G

BUTT, V. S.
The Relation Between the Synthesis of Inorganic Polyphosphate and Phosphate Uptake by Chlorella Vulgaris,
W74-04094 5C

BUXTON, D. R.
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

CABLE, L. W.
Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

CAIRNS, J. JR.
In-Plant Biological Monitoring,
W74-03855 5A

CALDER, G. V.
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

CALDWELL, J. S.
Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

CANTERFORD, D. R.
Direct Determination of Sulfide by Rapid Direct Current Polarography,
W74-03865 2K

CAREY, F. G.
Regulation of Brain and Eye Temperatures by the Bluefin Tuna,
W74-04239 5C

CARFAGNO, D. G.
Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

CARLSON, R. F.
Thermal Tolerances of Interior Alaskan Arctic Grayling (Thymallus arcticus),
W74-03759 5C

Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

CARMACK, E. C.
Some Physical and Chemical Properties of the Gulf of Corinth,
W74-04273 2L

CARSON, M. A.
Sediment Production in a Small Appalachian Watershed During Spring Runoff: The Eaton Basin, 1970-1972,
W74-04267 2J

CARTER, J. N.
Nitrate Determination by a Modified Conway Microdiffusion Method,
W74-03845 2G

CASTORINA, A. R.
Water Sampling and Laboratory Service,
W74-04024 5A

CAUSEY, L. V.
Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

CEDERSTROM, D. J.
Cost Analysis of Groundwater Supplies in the North Atlantic Region, 1970,
W74-03815 4B

CHADWICK, D. G.
Integrated Measurement of Soil Moisture by Use of Radio Waves,
W74-03772 2C

CHANEY, E.
Catastrophe Brewing in Quiet Waters,
W74-04025 5B

CHEONG, H-F
Dispersion of Contaminants Attached to Sediment Bed Load,
W74-03797 5B

CHERKASOVA, YE. V.
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

CHERNOUSOVA, V. M.
Effect of Artificial Water Aeration on Basin Algal Flora, (In Russian),
W74-03918 5C

CHESTER, R.
The Influence of Suspended Particles on the Precipitation of Iron in Natural Waters,
W74-04272 5B

CHI, C. T.
Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

CHIA, S. N.
The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

CHIOSILA, I.
Primary Productivity in the Crapina-Jijila Lake-Complex (Danube Flooded Area) During Severe Flooding,
W74-04194 5C

CHRISTY, F. T.JR.
Fisherman Quotas: A Tentative Suggestion for Domestic Management,
W74-03991 6E

CLARK, K. K.
Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

CLARK, R. M.
An Investment Decision Model for Control Technology,
W74-04079 5G

CLINKENBEARD, H. E.
Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience,
W74-03965 6B

COBB, W. M.
A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

COLE, S. L.
Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

COLLINS, J. A.
Loss of Mercury from Water During Storage,
W74-04048 5A

COLLINS, J. C.
Phosphates and the Environment,
W74-04107 5C

COLVERT, L. R.
Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2L

COMMONER, B.
The Environmental Cost of Economic Growth,
W74-04088 5G

CONVERSE, A. O.
Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

COOK, P. J.
Supratidal Environment and Geochemistry of Some Recent Dolomite Concretions, Broad Sound, Queensland, Australia,
W74-04069 2L

COOLEY, K. R.
Lower Cost Water Harvesting Methods,
W74-03952 3B

CORLEY, J. P.
Environmental Surveillance at Hanford for CY-1970,
W74-04192 5B

COYNE, R. V.
Loss of Mercury from Water During Storage,
W74-04048 5A

CRAMPTON, C. B.
A Landscape Zonation for the Southern and Central Mackenzie River Valley Based on Terrain Permafrost Characteristics,
W74-04266 2C

CROLEY, T. E. II.
Sequential Stochastic Optimization for Reservoir System,
W74-03914 4A

CUDNEY, D.
Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

CULP, G.
Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

CUMMINS, K. W.
Increasing the Processing Rate of Particulate Organic Matter in Streams,
W74-04202 5B

CUNDICK, R. P.
High Seas Intervention: Parameters of Unilateral Action,
W74-04031 6E

CURRUTHERS, I. D.
A New Approach to Domestic Water Rating,
W74-03963 6C

DADIKYAN, M. G.
Data on the Biology of Alburnus filippii Kessler Living in the Water Reserves of the Armenian SSR, (in Russian),
W74-03953 2I

DALPONT, G.
The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

DAVENPORT, C. V.
Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

DAVIS, M. E.
Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

DAWSON, G. W.
Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

DAY, A. D.
Arizona Indian Corn (Zea mays L.),
W74-03926 3F

DAY, M. B.
Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

DE BORTOLI, M.
Environmental Radioactivity - Ispra 1971,
W74-04176 5B

DE COSTA, J.
Species Diversity of Chydorid Fossil Communities in the Mississippi Valley,
W74-03941 5C

DEJAGER, J. M.
Effect of Moisture Stress Upon Maize Production and Its Economic Significance,
W74-03948 3F

DEMOYER, R. JR.
An Application Study in Water Distribution Control,
W74-03755 8C

DERJUGINA, Z.
Investigation of the Microflora of Swamp Ore and Lake Water by the Method of Electron Microscopy, (In Russian),
W74-04292 5A

DEVINE, S. B.
The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments,
W74-04268 2K

DEYOE, C. W.
Investigations of Nutrition and Metabolism of Catfish and Utilization of Fisheries Products,
W74-03802 8I

DIEHL, W. T.
A Comparative Study of Plankton Respiration in an Acid Polluted Lake and Its Acid Free Embayments,
W74-03935 5C

DILLEY, A. C.
The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

DOBRENZ, A. K.
Alfalfa Quality: Is There a Difference,
W74-03930 3F

DOHADINA, T. V.
Yellow-Green Algae of Wastes, (In Ukranian),
W74-03919 5A

DOKOS, J. M.
Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

DOLAN, R.
Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

DOLINSEK, F.
Application of the Carbon Cup Atomisation Technique in Water Analysis by Atomic-Absorption Spectroscopy,
W74-04073 5A

DONDERSKI, W.
Utilization of Aromatic Compounds by Benthic Microorganisms of a Eutrophic Lake,
W74-04295 5C

DONNER, P. J.
The Rotifers of the Submerged Mosses and Other Biotopes in the Dammed Regions of the Danube at the German-Austrian Frontier, (In German),
W74-04001 2I

DOSHI, M. R.
An Improved Mixing Length Theory of Turbulent Heat and Mass Transfer,
W74-04231 8B

DOUB, W. O.
The Environmental and Regulatory Aspects of the Breeder Reactor,
W74-04238 5B

DOUGAN, J.
Detection and Quantitative Measurement of Fecal Water Pollution Using a Solid-Injection Gas Chromatographic Technique and Fecal Steroids as a Chemical Index,
W74-03887 5A

DOUGLAS, E. L.
Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

DRANOVSKAYA, L. M.
Spectrophotometric Determination of Hexachlorobutadiene (HCBD) in Soil and Water, (In Russian),
W74-04293 5B

DREW, D. M.
Simultaneous Determination of Ferrocyanide and Ferricyanide in Aqueous Solutions Using Infrared Spectrometry,
W74-03866 5A

DUBININA, G.
Investigation of the Microflora of Swamp Ore and Lake Water by the Method of Electron Microscopy, (In Russian),
W74-04292 5A

DUCLOS, G.
Appreciation of the Fitness for Utilization of the Soils of Provence,
W74-04125 2G

DUGANDZIC, R. J.
Remote Control is Coming,
W74-04153 8C

DUKE, H. R.
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

DUNSTAN, W. M.
Intensive Outdoor Culture of Marine Phytoplankton Enriched with Treated Sewage Effluent,
W74-04103 5D

EAGLESON, P. S.
Theoretical Study of Longshore Currents on a Plane Beach,
W74-04214 2E

EATON, J. G.
Chronic Toxicity of a Copper, Cadmium and Zinc Mixture to the Fathead Minnow (Pimephales promelas Rafinesque),
W74-03873 5C

ECKERT, M.
Concepts of Externalities and Social Costs,
W74-03908 6B

EDWARDS, D. M.
Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

EDZWALD, J. K.
Coagulation in Estuaries,
W74-04257 5B

EGGELSMANN, R.
The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

EINSTEIN, H. A.
The Rhein Study,
W74-03788 2J

EISENMANN, J. L.
Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

ELAGINA, T. S.
Primary Production and Destruction of Organic Matter in 2 Lakes of Different Types, (In Russian),
W74-03944 5C

ENAKI, G. A.
Organic Matter of the Soil in the Kiev Reservoir and its Role in the Development of Benthic Algae, (In Russian),
W74-04281 5C

ENFIELD, C. G.
Evaluation of Water Flux Above a Deep Water Table Using Thermocouple Psychrometers,
W74-03776 2G

ENGBERG, R. A.
Selenium in Nebraska's Groundwater and Streams,
W74-03813 5B

EPPLEY, R. W.
Temperature and Phytoplankton Growth in the Sea,
W74-04233 5C

ERTIL, M.
Preliminary Data About the Seasonal Changes and Vertical Stratification of Periphyton from the Middle Reach of the River Danube,
W74-04294 5A

ESMAIL, W. J.
The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

EVANS, D. R.
Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

EYMAN, L. D.
A Comparison of Invertebrate Drift in Three Michigan Streams,
W74-03902 5B

FAGERLIND, T.
Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

FANG, C. S.
The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

FERGUSON, J.
Apparatus for Studies of Artificial Sediments,
W74-04057 2J

FERM, J. C.
Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

FERREL, R. E. JR.
The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments,
W74-04268 2K

FILIPPOV, A. KH.
Statistical Characteristics of Thunderstorms in Yakutsk Assr (Statisticheskiye kharakteristiki groz Yakutii),
W74-04253 2B

FISCHBACH, P. E.
Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

FISHER, J.
Time Dependent Shear Stress Beneath a Shoaling Wave,
W74-04213 2J

FITZSIMMONS, S. J.
A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

FLEMING, W. G.
Water-Sediment Splitter for Runoff Samples Containing Coarse-Grained Sediment,
W74-03780 2J

FLYNN, W. W.
A Solvent-Extraction Method for the Determination of Manganese-54 in Sea Water,
W74-03886 5A

FOGG, A. G.
Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

FORCIER, L. K.
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

FORSBERG, C.
A Programme for Studies of the Recovery of Polluted Lakes. The Effect of Chemical Sewage Treatment and Diversion of Sewage,
W74-04105 5C

FORSUND, F. R.
Externalities, Environmental Pollution and Allocation in Space: A General Equilibrium Approach,
W74-04084 5G

FOSBERG, M. A.
Fire Climates in the Southwest,
W74-04130 4A

FOWLER, S. W.
Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

FRANKEL, L.
Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

FRANKEL, R. J.
Groundwater Recharge for Waste Water Reclamation and/or Storage of Supplies: A Cost Comparison with Conventional Methods,
W74-03825 5D

FRASIER, G. W.
Lower Cost Water Harvesting Methods,
W74-03952 3B

FREEBURG, L. C.
Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

FRIBERG, S.
Waste Water Impurity Level Affects Flocculation Efficiency of Polyelectrolytes,
W74-04195 5D

FRIEDMAN, G. M.
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

FRITZ, J. S.
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

FROST, I. C.
Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

FROTA, J. N. E.
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

FRY, F. E. J.
The Effect of Changes in Ambient Temperature on Spontaneous Activity in Skipjack Tuna,
W74-04241 5C

FULLERTON, H.
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

FURMAN, R. W.
Fire Climates in the Southwest,
W74-04130 4A

GAGLIONE, P.
Environmental Radioactivity - Ispra 1971,
W74-04176 5B

GAINES, A. G. JR.
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

GAIPOVA, A. G.
Gross Chemical Composition of Murgab Oasis Desertified and Ancient-Irrigation Soils (In Russian),
W74-04123 3C

GAMSON, R. M.
Test for Anticholinesterase Materials in Water,
W74-03838 5A

GARCIA, J. D.
A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

GARDINER, J.
The Chemistry of Cadmium in Natural Water--I: A Study of Cadmium Complex Formation Using the Cadmium Specific-Ion Electrode,
W74-03775 5B

GARLAND, J. H. N.
Nutrient Budgets in Rivers,
W74-03947 5C

GARTON, J. E.
Semi-Portable Sheet Metal Flume for Automated Irrigation,
W74-04138 3F

GASANENKO, A. YA.
Harvest Qualities of Various Sizes of Hard Winter Wheat Seeds Under Irrigated Conditions in the Southern Steppes of the Ukraine, (In Russian),
W74-03915 3F

GAVRILA, L.
Primary Productivity in the Crapina-Jijila Lake-Complex (Danube Flooded Area) During Severe Flooding,
W74-04194 5C

GEBHART, B.
Laminar and Axisymmetric Vertical Jets in a Stably Stratified Environment,
W74-04224 8B

GELDIAY, R.
Preliminary Survey of Golcuk, A Eutrophic Mountain Lake in Western Turkey,
W74-03946 5C

GELOSI, E.
Bioecological Observations on Gambusia affinis Holbrooki Girard Living in Sulfurous, Warm and Brackish Waters (In Italian),
W74-04122 2I

GERMAN, E. R.
Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

GILL, W. N.
An Improved Mixing Length Theory of Turbulent Heat and Mass Transfer,
W74-04231 8B

GILLHAM, R. W.

GILLHAM, R. W.
An Experimental Study of Soil Water Flow Systems Involving Hysteresis,
W74-03760 2G

GILLINGS, O. J.
Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

GILMAN, H. D.
An Application Study in Water Distribution Control,
W74-03755 8C

GLADYSHEV, A. I.
Structure and Productivity of the Phytomass of Gigantic Bunch-Forming Grasses in the Amu Darya Floodplain, (In Russian),
W74-04282 2I

GLANCY, P. A.
A Reconnaissance of Streamflow and Fluvial Sediment Transport, Incline Village Area, Lake Tahoe, Nevada, Second Progress Report 1971,
W74-04050 2J

GODDARD, J. E.
An Evaluation of Urban Flood Plains,
W74-03756 6F

GOGOLAK, C. V.
Comparison of Measured and Calculated Radiation Exposure from a Boiling Water Reactor Plume,
W74-04175 5B

GOLDINA, L. P.
Lakes of the Bol'shoy Patok River Basin (Northern Urals). Their Importance and Preservation (Ozera basseyna r. Bol'shoy Patok (Pripolyarnyy Ural), ikh znacheniye i okhrana).,
W74-03832 2H

GOLDSMITH, V.
Internal Geometry and Origin of Vegetated Coastal Sand Dunes,
W74-04061 2J

GOLDTHORPE, J. C.
Better Pump Installation,
W74-04154 8C

GOLEMON, R. K.
The Future of Water Quality Control,
W74-04026 5G

GOODMAN, A.
Test for Anticholinesterase Materials in Water,
W74-03838 5A

GOODMAN, M. Y.
An Application Study in Water Distribution Control,
W74-03755 8C

GOPHEN, M.
Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

GORBACH, E. I.
Fecundity of the Grass Carp Ctenopharyngodon idella (Val.) in the Amur Basin (In Russian),
W74-04121 2I

GORDON, R. C.
Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

GOSHKA, A. T.
Hygienic Evaluation of a Machine for Applying Granulated Herbicides in Canals of the Collector-Drainage Network, (In Russian),
W74-04166 5G

GOSSE, L. E.
Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

GOULDEN, P. D.
Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

GRAEF, W.
Pollution of Drinking Water by Oil in the Pipes of New Buildings, (In German),
W74-03950 5B

GRAFFTEY, W. H.
Let's Enforce the Rules,
W74-03891 6E

GRANADE, J. W.
The Economic Impact of the Ban on Commercial Fishing on Lake Pickwick,
W74-03910 6B

GRANT, B. R.
The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

GREY, B. J.
Sediment Production in a Small Appalachian Watershed During Spring Runoff: The Eaton Basin, 1970-1972,
W74-04267 2J

GRIEBENOW, G.
Levels of Assessment,
W74-04035 6B

GROVE, D. R.
Arizona Indian Corn (Zea mays L.),
W74-03926 3F

GSTALDER, S. A.
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

GUSEINOV, S. G.
Accumulation of Root Mass in Perennial Legume Plots on Eroded Soils (In Azerbaidzhan),
W74-03874 3F

GVIRTZMAN, G.
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

HAGAN, R. M.
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

HAGEN, H. K.
Fish Behavior Related to Thermal Pollution,
W74-03795 5C

HAHN, G. J.
A Survey of Prediction Intervals and Their Applications,
W74-03858 7C

HAHNE, H. C. H.
The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

HAISE, H. R.
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

HALE, W. H.
Alfalfa Quality: Is There a Difference,
W74-03930 3F

HALL, W.
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

HAMPTON, K.
Water Commission Endorses User Pay Concept,
W74-04036 6E

HANDLEY, R.
Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

HARRIS, L. D.
An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

HARRIS, W. F. JR.
Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

HART, I. C.
Nutrient Budgets in Rivers,
W74-03947 5C

HARTLEY, E. R.
Recycled Water,
W74-03976 5D

HARTMAN, C. W.
Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

HASSAN, A. A.
Water Quality Cycle--Reflection of Activities of Nature and Man,
W74-04263 5B

HATFIELD, H. F.
The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

HAVEMAN, R. H.
Common Property, Congestion, and Environmental Pollution,
W74-03958 6G

HAVENAAR, I.
Filtration Behavior of Circulating Drilling Fluids,
W74-04141 8B

HAWERMAN, B.
A Programme for Studies of the Recovery of Polluted Lakes. The Effect of Chemical Sewage Treatment and Diversion of Sewage,
W74-04105 5C

HEANEY, J. P.
Water Resources and Social Choices,
W74-03951 6B

HELD, J. W.
Causes and Control of Algal Blooms in Spiritwood Lake, North Dakota,
W74-03906 5C

HELMOND, I.
The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

HEM, J. D.
Stability Field Diagrams as Aids in Iron Chemistry Studies,
W74-04163 2K

HEMMINGSEN, E. A.
Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

HENNICK, D. G.
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

HEYRAUD, M.
Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

HILD, W.
Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

HILER, E. A.
Grain Sorghum Response to Trickle and Subserface Irrigation,
W74-04137 3F

HILL, C. T.
Thermal Pollution and its Control,
W74-04234 5B

HIMMELBLAU, D. M.
The Optimal Expansion of a Water Resources Systems,
W74-03754 6A

HINDALL, S. M.
Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

HINESLY, T. D.
Water Renovation for Unrestricted Re-Use,
W74-04034 5D

HLOBA, L. I.
The Ability of Some Minerals to Adsorb Viruses from Water(In Ukrainian),
W74-03978 5F

HOLLEY, W. H. JR.
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

HOLT, R. F.
Nitrogen and Phosphorus Losses in Surface Runoff from Agricultural Land as Influenced by Placement of Broadcast Fertilizer,
W74-04096 5C

HOPKINS, H. P. JR.
The Interaction of Water with Organic Solute Species,
W74-03762 1B

HOPKINS, W. B.
Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

HOWELL, J. A.
Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

Mixed Culture Biooxidation of Phenol. II. Steady State Experiments in Continuous Culture,
W74-03880 5C

Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

HOWELL, T. A.
Grain Sorghum Response to Trickle and Subserface Irrigation,
W74-04137 3F

HSIEH, J. J. C.
Evaluation of Water Flux Above a Deep Water Table Using Thermocouple Psychrometers,
W74-03776 2G

HUANG, C. H.
Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

HUBBELL, D. W.
Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

HUBER, C. O.
Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

HUBER, H.
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

HUGHES, J. L.
A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

HUISMAN, L.
The Hydraulics of Artificial Recharge,
W74-03820 4B

HUMPHREYS, H. W.
Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

HUNTER, R. E.
Pseudo-Crosslamination Formed by Climbing Adhesion Ripples,
W74-04062 2J

HYATT, M. L.
Alternative Futures Using the Wollman-Bonem Models,
W74-03888 6A

INCE, S.
Uncertainties in Hydrologic Models,
W74-03916 2A

INMAN, D. L.
Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

ISMATOV, O.
Anti-Erosive Role of Natural Plants in Low Foot-Hills Bordering the Ferghana Basin, (In Russian),
W74-04287 4D

ISON, H. C. K.
Corrosion and its Prevention in Waters,
W74-04151 8G

IVANOVA, M. N.
Type of Spawning Grounds and Ecology of Spawning for Stint, Osmerus eperlanus (L.), in the Rybinsk Reservoir, (In Russian),
W74-04277 2H

JAMES, L. D.
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

JANSEN, R. B.
Discharge System for the A.D. Edmonston Pumping Plant,
W74-04038 3B

JEFFERSON, P.
Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

JENKINS, S. R.
The Effectiveness of Sand Filters for the Removal of Colloidal Manganese Oxides from Water Using Selected Cations as Filter Aids,
W74-03893 5F

JOBSON, H. E.
Mechanics of Heat Transfer in Nonstratified Open-Channel Flows,
W74-03792 5B

JOHNSON, C. R.
Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

JOHNSON, G. V.
Irrigated Recreational Turfgrass with Sewage Effluent,
W74-03929 3C

JOHNSON, L. G.
Formation of Pentafluorobenzyl Derivatives for the Identification and Quantitation of Acid and Phenol Pesticide Residues,
W74-03850 5A

JONES, B. A. JR.
Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

JONES, D. R.
The Effect of Thermal Acclimation on Heart rate and Oxygen Consumption of Frogs During Submergence,
W74-04242 5A

JONES, P. R.

JONES, P. R.
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

JORDAN, W. R.
Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

JUNK, G. A.
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

JURIS, S.
Preliminary Data About the Seasonal Changes and Vertical Stratification of Periphyton from the Middle Reach of the River Danube,
W74-04294 5A

KALTER, R. J.
Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

KANE, B. E.
Thermophilic Fungi in a Municipal Waste Compost System,
W74-03875 5A

KARPUSHIN, N. M.
Proteolytic Activity of Saprophytic Microflora in the Dneprodzerzhinskoe Reservoir, (In Russian),
W74-03949 5C

KARWEIK, D.
Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

KAS'YANOV, V. L.
Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

KASHCHENKO, L. A.
Radiation Reaction of the Adenohypophysis-Gonads System in Cold-Blooded Animals,
W74-04180 5C

KATZ, D. L.
Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

KAUPER, E. K.
The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

KAZAKOV, I. F.
Structure and Productivity of the Phytomass of Gigantic Bunch-Forming Grasses in the Amu Darya Floodplain, (In Russian),
W74-04282 2I

KELLER, J.
Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

KEMMERIKH, A. O.
A Map of Annual River Runoff in the Pamirs and Pamir-Alay Mountains (Karta godovogo stoka rek Pamira i Pamiro-Alaya),
W74-03836 2E

KENNEDY, C.
Cleaning up a River,
W74-03968 5G

KERMODE, R. I.
Process Control of Activated Sludge Treatment,
W74-03764 5D

KERNODLE, D. R.
Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

KHALMATOV, N. M.
The Biology of Pike Perch in the Arnasaya Lakes System, (In Russian),
W74-03961 2H

KHASHES, TS. M.
Some Causes of Failure in the Closeness of Correlative Connection Between Tree Species Transpiration and Meteorological Factors, (In Russian),
W74-04283 2D

KHOROSKHO, P. N.
Water Supply in the Volga Basin and its Effect on Strugeon Reproduction, Family Acipenseridae Under Conditions of Natural and Regulated Flow, (In Russian),
W74-04279 8I

KHUTORYANSKAYA, D. F.
Statistical Characteristics of Thunderstorms in Yakutsk Assr (Statisticheskiye kharakteristiki groz Yakutii),
W74-04253 2B

KIDSON, C.
Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

KIMBALL, B. A.
Simulation of the Energy Balance of a Greenhouse,
W74-04126 2I

Water Vapor Movement Through Mulches Under Field Conditions,
W74-03784 2G

KLAASSEN, L. H.
Economic and Social Projects with Environmental Repercussions: A Shadow Project Approach,
W74-04085 6B

KLEIN, A. E.
The Effects of Artificial Sunlight Upon Floating Oils,
W74-03777 5B

KLEIN, J. M.
Water-Level Declines and Ground-Water Quality, Upper Black Squirrel Creek Basin, Colorado,
W74-03808 4B

KLINGEMAN, P. C.
Indications of Streambed Degradation in the Willamette Valley,
W74-03770 2J

KLUTE, A.
An Experimental Study of Soil Water Flow Systems Involving Hysteresis,
W74-03760 2G

KNAPP, W.
Pollution of Drinking Water by Oil in the Pipes of New Buildings, (In German),
W74-03950 5B

KNUDSEN, G. M.
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

KOCWOWA, E.
Protection of Saprophytes as the Main Factor in a Program for Protection of Water Environments, (In Polish),
W74-04297 5G

KOEPPE, D. E.
Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses,
W74-04127 3F

KOH, R. C. Y.
On the Breaking of Waves Arriving at an Angle to the Shore,
W74-04217 2H

Wave Shoaling,
W74-04216 2E

KOMAR, P. D.
An Occurrence of 'Brick Pattern' Oscillatory Ripple Marks at Mono Lake, California,
W74-04064 2J

The Threshold of Sediment Movement Under Oscillatory Water Waves,
W74-04065 2J

KONDRATSOVA, O. F.
Quasi 2-year Variation in Runoff of USSR Rivers (Kvazidvukhletnyaya variatsiya v stoke rek SSSR),
W74-03834 2E

KONDUR, L. V.
The Feeding of Carassius auratus gibelio Bloch. From Kairakkum Reservoir, (In Russian),
W74-04109 2H

KOSIK, J.
Investigation of the Dynamics of the Moisture State of the Soil Under Several Years of Forage Crops and Under Sainfoin, (In Czech),
W74-03917 3F

KOZLOVA, I. V.
Experiment in Computing the Total Production of Zooplankton Using Ural Lakes as an Example (In Russian),
W74-04120 2H

KRAPIVIN, V. F.
A Study of a Generalized Mathematical Model 'Predator-Sacrifice,' (In Russian),
W74-04092 2I

KRASE, J. M.
The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

KRENKEL, P. A.
Some Effects of Wastes on Natural Waters,
W74-03793 5B

Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

KRIGMAN, A.
Guide to Selecting Programmable DC Power Supplies,
W74-03863 7C

KRIZ, G. J.
Physical Effects of Maintaining Drainage Channels in North Carolina's Coastal Area,
W74-04075 2E

KRIZEK, R. J.
Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

KRONE, R. B.
Borehole Recharge: The Compatability of Recharge Water With the Aquifer,
W74-03822 4B

KROONTJE, W.
The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

KROUT, J. E.
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

KRUGLOVA, V. M.
Results of Acclimatization of Corophium sowinskyi (Mart.) in the Veselovsk Reservoir, (In Russian),
W74-04099 2H

KUDEVICH, S. N.
Hygienic Evaluation of a Machine for Applying Granulated Herbicides in Canals of the Collector-Drainage Network, (In Russian),
W74-04166 5G

KUHN, R.
On Saltwater Hot Springs in the Coast Area of Western Anatolia, Turkey (Uber Salzwasser-Thermen Im Kustenland Von West-Anatolien, Turkei),
W74-04270 2F

KUMAR, V.
Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

LACROIX, P. G.
Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

LAMB, C. E.
Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

LAMKE, R. D.
A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

LANG, A. R. G.
Leaf Orientation of a Cotton Plant,
W74-04132 3F

LANTZ, P. M.
An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level,
W74-04104 5A

LAPERRIERE, J. D.
Thermal Tolerances of Interior Alaskan Arctic Grayling (Thymallus arcticus),
W74-03759 5C

LARA, O. G.
Floods in Iowa: Technical Manual for Estimating Their Magnitude and Frequency,
W74-03805 4A

LASTOVET'S, L. M.
The Ability of Some Minerals to Adsorb Viruses from Water(In Ukrainian),
W74-03978 5F

LAURENCE, P. T.
Column Partition Chromatographic Determination of Sodium Alkane Monosulfonates,
W74-03867 5A

LAURENT, E. A.
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

LAURIA, D. T.
Water-Supply Planning in Developing Countries,
W74-04117 6A

LAVE, L. B.
Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

LAWLER, J. P.
Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

LAWSON, J. R.
Treatment of Oily and Metal-Containing Wastewater,
W74-03852 5B

LEBARON, A.
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

LEBEDEV, YU. M.
Some Environmental Factors Determining the Primary Production of the Mozhaisk Reservoir, (In Russian),
W74-03939 5C

LEITZELL, T. L.
The Ocean Dumping Convention--A Hopeful Beginning,
W74-04032 5G

LEMBKE, W. D.
Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

LEMEHAUTE, B.
On the Breaking of Waves Arriving at an Angle to the Shore,
W74-04217 2H

LEMEHAUTE, B. J.
Wave Shoaling,
W74-04215 2E

Wave Shoaling,
W74-04216 2E

LENNEMAN, W. L.
Management of Radioactive Aqueous Wastes from AEC Fuel-Reprocessing Operations,
W74-04188 5B

LENNOX, R. J.
An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

LEONARD, R. A.
Water-Sediment Splitter for Runoff Samples Containing Coarse-Grained Sediment,
W74-03780 2J

LEWKOWICZ, S.
Chemical Changes in the Water and Accumulation Stratum of Soils in Ponds Fertilized with Beet-Sugar Factory Wastes,
W74-04110 5C

LEWOSZ, W.
Utilization of Aromatic Compounds by Benthic Microorganisms of a Eutrophic Lake,
W74-04295 5C

LIN, Y. H.
Treatment of Oily and Metal-Containing Wastewater,
W74-03852 5B

LINDQUIST, J.
A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

LINTHICUM, D. S.
Regulation of Brain and Eye Temperatures by the Bluefin Tuna,
W74-04239 5C

LIOTTA, C. L.
The Interaction of Water with Organic Solute Species,
W74-03762 1B

LIPAEVA, L. I.
Changes in Vessel Diameter in Two Species of Herbaceous Plants, (In Russian),
W74-04280 2I

LISHKA, R. J.
Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

LISTON, J.
Temperature-Gradient Incubator for the Growth of Clostridia,
W74-03878 5A

LOCHAMY, J. C.
Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

LOGVINENKO, N. V.
Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

LOWRIGHT, R. H.
Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

LUBCHENKO, I. YU.
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

LUCERO, E. D.
Annual Compilation and Analysis of Hydrologic Data for Elm Fork Trinity River, Trinity River Basin, Texas, 1971,
W74-03818 2E

LUCKEY, R. R.
Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

LUKINA, N. A.
Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

LUTHIN, J. N.
Drainage Design as Influenced by Conditions in the Vicinity of the Drain Line,
W74-04200 4A

LUTZ, G. A.
Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

LYALIKOV, YU. S.
Spectrophotometric Determination of Hexachlorobutadiene (HCBD) in Soil and Water, (In Russian),
W74-04293 5B

LYLE, G. G.
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

LYLE, R. E.
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

LYNCH, P. F.
Identifying Source of Petroleum by Infrared Spectroscopy,
W74-03854 5A

MACNISH, R. D.
Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

MAHMOOD, K.
Lognormal Size Distribution of Particulate Matter,
W74-04058 2J

MAKSIMCHUK, V. L.
Investigation of the Velocity Structure in the Bottom Region of A Turbulent Wave Flow,
W74-04250 8B

MAKSUNOV, V. A.
Age Structure and Growth of Fish in Waters of Northern Tadzhikistan, (In Russian),
W74-04071 8I

MALIK, A. S.
Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

MALLET, J. B.
Effect of Moisture Stress Upon Maize Production and Its Economic Significance,
W74-03948 3F

MANSFIELD, F.
The Relationship Between Galvanic Current and Dissolution Rates,
W74-04168 8G

MANTON, M. M. M.
Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

MARCUS, M. D.
An Ecological Evaluation of a Thermal Discharge. Part II: The Distribution of Phytoplankton and Primary Productivity Near the Western Shore of Lake Erie,
W74-03936 5C

MARCZEWSKI, C. Z.
Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode,
W74-03864 5A

MARSHALL, N. F.
'Internal Waves' Advancing Along Submarine Canyons,
W74-04261 2E

MARSTRAND, P. K.
The Pollution Sub-System,
W74-03964 6G

MATCHES, J. R.
Temperature-Gradient Incubator for the Growth of Clostridia,
W74-03878 5A

MATTHEWS, R. K.
Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

MAUQUOY, G.
Microbiological Determination of Thiram,
W74-03846 5A

MAY, M. L.
Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

MCARTHUR, D. S.
Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

MCCAIN, J. F.
Water Availability in Mobile County, Alabama,
W74-03811 4B

MCCAULL, J.
Assault on a Lake,
W74-03975 5G

MCCLELLAND, J. J. JR.
An Oceanographic Investigation of Thermal Changes in Monterey Bay, California, September 1971 - January 1972,
W74-04223 2L

MCCONAGHA, D. L.
Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

MCCOY, J.
Effects of the Feeder Canal on the Water Resources of the Fort Lauderdale Prospect Well-Field Area,
W74-04259 5G

MCFARLAND, J. W.
Alternative Futures Using the Wollman-Bonem Models,
W74-03888 6A

MCFARLANE, A.
The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

MCFARREN, E. F.
Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

MCGINNIS, S. M.
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

MCHENRY, J. R.
Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

MCLEAN, A. Y.
Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

MCLOUGHLIN, P. A.
'Internal Waves' Advancing Along Submarine Canyons,
W74-04261 2E

MCLUSKY, D. S.
The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

MCMICHAEL, B. L.
Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

MEAD, D. J.
Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

MEL'NIKOV, G. B.
Proteolytic Activity of Saprophytic Microflora in the Dneprodzerzhinskoe Reservoir, (In Russian),
W74-03949 5C

MERCER, B. W.
Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

MERMOD, M. J.
Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

MESSINGER, W. C.
Industrial Water Pollution Control--An Overview,
W74-04028 5D

METWALLI, A. M.
Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

MEYER, R. E.
An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level,
W74-04104 5A

MILLER, D.
Chemical and Biological Survey of the Savannah River Adjacent to Elba Island,
W74-03804 5B

MILLER, D. S.
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

MILLER, E. G.
Water Resources of the New Jersey Part of the Ramapo River Basin,
W74-03806 4B

MILLER, L. C.
Seasonal Variation in Heart Rate Response to Core Temperature Changes,
W74-04244 5C

MILLER, M. C.
Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

The Threshold of Sediment Movement Under Oscillatory Water Waves,
W74-04065 2J

MILLER, R. J.
Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses,
W74-04127 3F

MIRZAMBETOV, K.
The Effect of Drought on the Cotton Water Regimen at Different Stages of its Development, (In Russian),
W74-03942 3F

MITCHELL, R. C.
U-Tube Aeration,
W74-04046 5D

MIZELL, S.
Seasonal Variation in Heart Rate Response to Core Temperature Changes,
W74-04244 5C

MODANI, N. K.
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

MOEHRL, K. E.
Well Grouting and Well Protection,
W74-04164 8F

MOHSEN, A. F.
Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

MOLLO-CHRISTENSEN, E. L.
Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

MOOLANI, M. K.
Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

MOORE, E. J.
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

MOORE, R. E.
Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

MORDVINTSEV, G. M.
Field Shelterbelt Afforestation and Greenery Planting,
W74-03883 3F

MORGAN, W. D.
A General Procedure for Consumption-Density Studies,
W74-04040 6D

MORROW, J. E.
Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

MORSE, D. C.
The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

MOUSSA, M. T.
Measuring Volumes of Sedimentary Grains,
W74-04056 2J

MUCKLEROY, J. A.
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

MUKHAMEDIEV, A. M.
Closed Season Regulation for Table Fish in the Sukhandar'ya River Basin, (In Russian),
W74-04290 8I

MULLINS, J. T.
Thermophilic Fungi in a Municipal Waste Compost System,
W74-03875 5A

MUNKOV, P. I.
Some Data on the Water Economy and the Utilization of Water Resources in Bulgaria, Including Irrigation,
W74-03954 3F

MUYS, J. C.
Interstate Compacts and Regional Water Resources Planning and Management,
W74-04000 6E

MYAL'GI, U.
Determination of Cation Capacity of Humic Acids by Thin Ash Content, (In Estonian),
W74-04299 5A

Determining the Cation Capacity of Humic Substances Using Flame Photometry, (In Estonian),
W74-04298 5A

MYERS, D. A.
Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

MYERS, L. E.
Lower Cost Water Harvesting Methods,
W74-03952 3B

NABRZYSKI, M.
Improvements in the Wet Oxidation-Dithizone Method for Determining Low Mercury Levels in Food,
W74-03869 5A

NALEPA, T. F.
An Ecological Evaluation of a Thermal Discharge. Part III: The Distribution of Zooplankton Along the Western Shore of Lake Erie,
W74-04095 5C

NASR, A. H.
Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

NAUMAN, J. W.
Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

NAVROT, J.
Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

NAZAROV, G. I.
Self-Similar Solutions for a Three-Component Axisymmetrical Flow of a Viscous Fluid,
W74-04248 8B

NEBEKER, A. V.
Effect of Low Oxygen Concentration on Survival and Emergence of Aquatic Insects,
W74-04100 5C

NEDELCU, G. A.

NEDELCU, G. A.
Zonation of Aquatic and Swamp Vegetation, (In Rumanian),
W74-03843 2H

NELSON, W.
A Survey of Prediction Intervals and Their Applications,
W74-03858 7C

NEVINS, F. S.
Los Banos Reservoir Recreation Development Plan,
W74-03956 6B

NEWELL, B. S.
The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

NIELSON, F. D.
Behavior of Cohesive Material From a Soil Engineer's Viewpoint,
W74-03798 2J

NIJKAMP, P.
Some Models for the Economic Evaluation of the Environment,
W74-04083 5G

NIKOL'SKII, G. V.
Some Aspects of the Theory of Exploitation of Fish Resources, (In Russian),
W74-04278 8I

NISHCHUK, V. S.
Investigation of the Velocity Structure in the Bottom Region of A Turbulent Wave Flow,
W74-04250 8B

NIYAZOVA, M. M.
Gross Chemical Composition of Murgab Oasis Desertified and Ancient-Irrigation Soils (In Russian),
W74-04123 3C

NORDBERG, L.
Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

NORDIN, C. F.
Suspended-Sediment Sampling Variability,
W74-03801 2J

NORERO, A. L.
Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

NYANDAT, N. N.
Gypsum as Improver of the Permeability of Grumusol (Typic Pellustert) in the Kano Plains of Kenya,
W74-04193 2G

O'LEARY, J. W.
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

O'MELIA, C. R.
Coagulation in Estuaries,
W74-04257 5B

ODEH, A. S.
A Method for Determining the Static Pressure of a Well from Buildup Data,
W74-04162 8G

OGLESBY, R. T.
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

OHATA, C. A.
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

OLDEMANN, A. A.
Architecture of Riparian Forest Vegetation of Rivers and Creeks of French Guiana,
W74-04285 2I

OMBRET, O.
A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

OMODT, F. H.
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

OPUSZYNSKI, K.
Use of Phytophagous Fish to Control Aquatic Plants,
W74-04106 3B

OSTER, E. A.
Flood Profiles in the Umpqua River Basin, Oregon, Part 2,
W74-03803 4A

OVERLAND, J. E.
A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

OWENS, C. W.
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

OWENS, M.
Nutrient Budgets in Rivers,
W74-03947 5C

PADGETT, J. H.
An Industrial Pollution Index,
W74-03889 5G

PAELINCK, J.
Some Models for the Economic Evaluation of the Environment,
W74-04083 5G

PAGE, R. W.
Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California),
W74-04274 7C

PAGENKOPF, G. K.
Cation Adsorption and Desorption Rates in Natural Water Studies,
W74-03765 5A

PALACAS, J. G.
Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

PALAMARCHUK, I. K.
Organic Matter of the Soil in the Kiev Reservoir and its Role in the Development of Benthic Algae, (In Russian),
W74-04281 5C

PALAMARCHUK, L. K.
Exchangeable Cations in Soils of the Dnieper Reservoirs,
W74-04255 2H

PAWLOWSKY, U.
Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

Mixed Culture Biooxidation of Phenol. II. Steady State Experiments in Continuous Culture,
W74-03880 5C

Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

PAYNE, F. A.
Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

PEACH, P. A.
Gelatin Coated Microscope Slides in Sedimentary Size Analysis,
W74-04055 2J

PECK, T. R.
Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

PEJLER, B.
Rotifer Plankton in Brackish and Freshwater Localities in Central Sweden,
W74-04041 5C

PERDUE, M.
The Interaction of Water with Organic Solute Species,
W74-03762 1B

PERLYUK, M. F.
Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

PERRIE, L. A.
Gelatin Coated Microscope Slides in Sedimentary Size Analysis,
W74-04055 2J

PETERKA, J. J.
Causes and Control of Algal Blooms in Spiritwood Lake, North Dakota,
W74-03906 5C

PETERSON, G. E.
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

PETERSON, J. O.
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

PETROVA, M. A.
Primary Production and Destruction of Organic Matter in 2 Lakes of Different Types, (In Russian),
W74-03944 5C

PETROVIC, G.
The Inundation Region of the Danube, Km 1402,
W74-04080 2K

PFEIFFER, M. G.
The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

PHILLIPS, C.
Systems Simulation of Economic Factors and Their Relation to the Water System of Wyoming's Platte River Basin,
W74-03892 6A

PHILLIPS, R. E.
Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

PICKLE, H. B.
The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

PIERRE, J-F.
The Diatomaceous Populations in the Basin of the Meurthe River: Attempt at an Hydrobiological Synthesis, (In French),
W74-04288 2I

PIERSALL, C. H. JR.
Cost Analysis of Optional Methods of Shipboard Domestic Waste Disposal,
W74-04115 5D

PILPEL, N.
The Effects of Artificial Sunlight Upon Floating Oils,
W74-03777 5B

PIROGOV, V. V.
The Mollusk Fauna of the Bolshoi Karabulak Oxbow Lake (Volga Delta), (In Russian),
W74-04165 2H

PISKUN, V. F.
Harvest Qualities of Various Sizes of Hard Winter Wheat Seeds Under Irrigated Conditions in the Southern Steppes of the Ukraine, (In Russian),
W74-03915 3F

PIVAZYAN, S. A.
Feeding and Food Relationships of the Trout Salmo ischchan Kessler and Whitefish Coregonus lavaretus Ludoga Poliakow of Lake Sevan, (In Russian),
W74-04203 2H

PODYMAKHIN, V. N.
Natural Radiation Loads on the Eggs of Marine and Fresh Water Organisms,
W74-04182 5C

POGODIN, A. G.
Primary Production and Destruction of Organic Matter in 2 Lakes of Different Types, (In Russian),
W74-03944 5C

POLLINGHER, U.
Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

POLOVKOVA, S. N.
Type of Spawning Grounds and Ecology of Spawning for Stint, Osmerus eperlanus (L.), in the Rybinsk Reservoir, (In Russian),
W74-04277 2H

POSEY, F. A.
An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level,
W74-04104 5A

POSPELOVA, E. B.
Annual Increase of Aboveground Phytomass of Some Tundra Shrubs, (In Russian),
W74-04286 2I

POURRIOT, R.
Hydrobiological Studies of 2 Shallow Ponds: Observations on Temperature and Plankton Distribution and the Influence of a Plant Cover Containing Lemna minor, (In French),
W74-04291 2H

POWELL, R. D.
Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

POWELL, W. J.
Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

PRATT, S. D.
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

PRUITT, W. O.
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

PRUSS, A. G.
Drought Resistance of Pear Varieties of the Main Ecological-Geographic Groups, (In Russian),
W74-04220 3F

PURRETT, L. A.
Looking for Pollution Under the Earth,
W74-04004 5B

PYATT, E. E.
Water Resources and Social Choices,
W74-03951 6B

QURESHI, G. A.
A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

RABOCHEV, I. S.
Gross Chemical Composition of Murgab Oasis Desertified and Ancient-Irrigation Soils (In Russian),
W74-04123 3C

RAHIM, S. A.
Absorptiometric Determination of Trace Amounts of Sulphide Ion in Water,
W74-04072 5A

RAIMDZHANOV, N.
Species Composition of Fishes in the Sanzar River, (In Russian),
W74-03945 2I

RAMEY, H. J. JR.
A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

RAPPE, A.
Microbiological Determination of Thiram,
W74-03846 5A

RAVERA, O.
Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

RAWLS, W. J.
Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

RAYNAL, J. C.
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

REED, P. C.
Water Availability in Mobile County, Alabama,
W74-03811 4B

REGER, S. J.
Benthic Macroinvertebrate Diversity in Three Differentially Perturbed Michigan Streams,
W74-03905 5C

REGIER, C.
Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

REIKH, E. M.
Results of Acclimatization of Corophium sowinskyi (Mart.) in the Veselovsk Reservoir, (In Russian),
W74-04099 2H

REIM, R. E.
Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

REINHEIMER, C. J.
Aerial Detection of Spill Sources,
W74-04196 5A

REMSON, I.
Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

RERBERG, M. S.
Microflora of Nutrient Solution in Soilless Growing of Vegetable Crops, (In Russian),
W74-04235 3F

RIIS, H.
Effect of Environmental Factors on Algae Count in the Main Soil Types of the Estonian SSR (In Estonian),
W74-04114 2G

RITCHIE, J. C.
Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

ROBERTS, A. A.
Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

ROBERTS, J. A.
The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

ROBERTS, K.
Waste Water Impurity Level Affects Flocculation Efficiency of Polyelectrolytes,
W74-04195 5D

ROBINSON, A.
Phenotypic Variability of the Envelope Proteins of Klebsiella aerogenes,
W74-03882 5C

ROBINSON, D. W.
Test for Anticholinesterase Materials in Water,
W74-03838 5A

ROBINSON, F. E.
Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

ROBINSON, J. D.
Nuclear Spin-Lattice Relaxation of Liquids Confined in Porous Solids,
W74-04157 2F

ROBISON, T. M.
Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

ROESSLER, M. A.
Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

ROMANKEVICH, YE. A.
Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

ROMBERG, G. P.
A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

ROSENBERG, N. J.
A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

ROSS, J. G.
Increasing Water Utilization Efficiency of a Pasture Grass by Increasing Aftermath Through Plant Selection,
W74-03773 3F

ROTMISTROV, M. M.
The Ability of Some Minerals to Adsorb Viruses from Water(In Ukrainian),
W74-03978 5F

RUCKS, A. C.
The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

RUDDER, C. L.
Aerial Detection of Spill Sources,
W74-04196 5A

RUFF, J. F.
Application of Remote Sensing to River Mechanics,
W74-03800 2E

RYDER, P. D.
Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

SAGOT, A. M.
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

SAILA, S. B.
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

SALAMA, O. A.
A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

SALEM, A. B.
Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

SALIM, A. Y.
Absorptiometric Determination of Trace Amounts of Sulphide Ion in Water,
W74-04072 5A

SANTOS-CAYADE, J.
River Response,
W74-03785 2E

SASSENBERG, P.
Changes in Statistical Processing of Groundwater Level Measurements (Wandlungen bei der statistischen Aufbereitung von Grundwasserstandsmesswerten),
W74-04247 2F

SATTAROV, K. S.
Closed Season Regulation for Table Fish in the Sukhandar'ya River Basin, (In Russian),
W74-04290 8I

SAYRE, W. W.
Natural Mixing Processes in Rivers,
W74-03790 5B

SCATEGNI, P.
Experiences with the Correction of Disordered Streams of the Alpine Type, (In Italian),
W74-04276 4D

SCHICHT, R. J.
Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

SCHILLING, E. G.
A Systematic Approach to the Analysis of Means. Part II. Analysis of Contrasts. Part III. Analysis of Non-Normal Data,
W74-03837 7C

SCHNEIDER, A.
Primary Productivity in the Crapina-Jijila Lake-Complex (Danube Flooded Area) During Severe Flooding,
W74-04194 5C

SCHNEIDER, C. W.
North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

SCHNEIDER, J. J.
Effects on Water Quality in the Shallow Aquifer due to the Operation of the Cross State Dump, Palm Beach County, Florida,
W74-04052 5B

SCHOENE, T. W.
The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

SCHUMAKER, G. A.
Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

SCHWANINGER, D. E.
Nitrate Determination by a Modified Conway Microdiffusion Method,
W74-03845 2G

SCOTT, H. D.
Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

SEARLES, R. B.
North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

SEESHOLTZ, J. R.
Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

SEGAR, D.
Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

SENTURIA, S. D.
Nuclear Spin-Lattice Relaxation of Liquids Confined in Porous Solids,
W74-04157 2F

SERVANT, J.
Seasonal Variations of the Salinity in Some Profiles and in the Water Table of the Sodic Soils of Camargue: Preliminary Results (In French),
W74-04124 2G

SEVART, M. D.
Aerial Radiological Measuring Survey of the Area Surrounding Big Rock Point Nuclear Plant, Big Rock Point, Michigan, 1968,
W74-04186 5B

SEVUK, A. S.
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

SEYMOUR, M. K.
Effects of Temperature Change on Irrigation Rate in Arenicola marina (L.),
W74-04225 5C

SHALAR', V. M.
Primary Production of Phytoplankton and Destruction of Organic Matter in the Prut River, (In Russian),
W74-04284 5C

SHAMPINE, W. J.
Chemical Quality of Surface Water in the Eastern Oswego River Basin, New York,
W74-03817 5A

SHAWTSOVA, T. M.
Dependence of the Growth of White Bream and Goldfish on Environment, (In Byelorussiau),
W74-04090 2H

SHEN, H. W.
Dispersion of Contaminants Attached to Sediment Bed Load,
W74-03797 5B

Flow Over Alluvial Bed,
W74-03786 2E

Flow Resistance over Short Simulated Vegetation and Various Tall Simulated Vegetation Groupings on Flow Resistance and Sediment Yield,
W74-03787 2E

SHEPARD, F. P.
'Internal Waves' Advancing Along Submarine Canyons,
W74-04261 2E

SHEREEF, S.
Absorptiometric Determination of Trace Amounts of Sulphide Ion in Water,
W74-04072 5A

SHERIFF, R. E.
Encyclopedic Dictionary of Exploration Geophysics,
W74-04142 8B

SHIH, S-M.
Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

SHIPLEY, J.
Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

SHIPLEY, W. K.
People V. Mack: A Sportsman's Definition of Navigability,
W74-03967 6E

SHIROKOVA, E. L.
Some Environmental Factors Determining the Primary Production of the Mozhaisk Reservoir, (In Russian),
W74-03939 5C

SHMAKOV, YU. I.
The Structural-Continuum Theory of Dilute Suspensions of Rigid Ellipsoidal Particles,
W74-04249 8B

SHOFNER, F. M.
Explicit Calibration of the PILLS II System,
W74-04198 5D

SHUCKROW, A. J.
Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

SHULMAN, M. D.
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

SHUPP, F. R.
Externalities, Shadow Prices, and Benefit-Cost Calculations,
W74-03960 6B

SILBERMAN, E.
Heated Surface Discharges into Flowing Ambient Streams and Lakes,
W74-03794 5D

SIMONS, D. B.
River Response,
W74-03785 2E

SIMONS, T. J.
Development of Three-Dimensional Numerical Models of the Great Lakes,
W74-04051 2H

SIMPSON JR, E. C.
Nitrate Determination by a Modified Conway Microdiffusion Method,
W74-03845 2G

SINCLAIR, T. C.
The Pollution Sub-System,
W74-03964 6G

SINGER, A.
Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

SIRENKO, L. A.
Effect of Artificial Water Aeration on Basin Algal Flora, (In Russian),
W74-03918 5C

SISSON, R.
The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

SKELLY, M. J.
Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

SKOGERBOE, G. V.
Agricultural Impact on Water Quality in Western Rivers,
W74-03796 5B

Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

SKORIK, L. V.
Organic Matter of the Soil in the Kiev Reservoir and its Role in the Development of Benthic Algae, (In Russian),
W74-04281 5C

SMALE, D.
Silcretes and Associated Silica Diagenesis in Southern Africa and Australia,
W74-04067 2J

SMALL, L. F.
Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

SMIRNOV, N. P.
Quasi 2-year Variation in Runoff of USSR Rivers (Kvazidvukhletnyaya variatsiya v stoke rek SSSR),
W74-03834 2E

SMITH, H. F.
Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

SMITH, J. D.
Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

SMITH, W. L.
The Dynamics of Brown Trout (Salmo trutta) and Sculpin (Cottus spp.) Populations as Indicators of Eutrophication,
W74-03904 5C

SNIEGOCKI, R. T.
Clogging in Recharge Wells, Causes and Cures,
W74-03824 4B

SONIER, F.
A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

SOUTHARD, J. B.
Flume Experiments on the Transition from Ripples to Lower Flat Bed with Increasing Sand Size,
W74-04063 2J

SPARKS, R. E.
In-Plant Biological Monitoring,
W74-03855 5A

SPIGARELLI, S. A.
A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

SPRAY, D. C.
Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

STANFORD, G.
Nitrate Determination by a Modified Conway Microdiffusion Method,
W74-03845 2G

STANFORD, R. A.
An Industrial Pollution Index,
W74-03889 5G

STARKEY, R. L.
Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

STEEL, J. A.
The Application of Fundamental Limnological Research in Water Supply System Design and Management,
W74-04111 5C

STEINEN, R. P.
Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

STEPANOVA, L. A.
Diet of the Mesocyclops leuckarti (Claus) and Leptodora kindtii (Focke) Populations in Lake Ilmen, (In Russian),
W74-04091 2H

STEPHENSON, D. A.
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

STEVENS, E. D.
The Effect of Changes in Ambient Temperature on Spontaneous Activity in Skipjack Tuna,
W74-04241 5C

STEVENS, H. H. JR.
Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

STEVENS, L. C. JR.
Effects of Deicing Chemicals Upon Ground and Surface Waters (Initial Program Development),
W74-04149 5B

STEWART, J. I.
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

STEWART, J. W.
Dewatering of the Clayton Formation During Construction of the Walter F. George Lock and Dam, Fort Gaines, Clay County, Georgia,
W74-03819 4B

STICKNEY, R. R.
Chemical and Biological Survey of the Savannah River Adjacent to Elba Island,
W74-03804 5B

STOTT, G. A.
The 'Tenacious' Iron Bacteria,
W74-04143 5B

STREET, D. R.
Concepts of Externalities and Social Costs,
W74-03908 6B

Opportunity Costs and Water Resource Use,
W74-03909 6B

Regional Interdependencies and External Diseconomies,
W74-03912 6B

STREICHER, M. A.
Synergistic Inhibition of Ferric Ion Corrosion During Chemical Cleaning of Metal Surfaces,
W74-04169 8G

STRZELCZYK, E.
Utilization of Aromatic Compounds by Benthic Microorganisms of a Eutrophic Lake,
W74-04295 5C

STUPAR, J.
Application of the Carbon Cup Atomisation Technique in Water Analysis by Atomic-Absorption Spectroscopy,
W74-04073 5A

SUHR, L. G
Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

SVEC, H. J.
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

SWICEGOOD, W. R.
Physical Effects of Maintaining Drainage Channels in North Carolina's Coastal Area,
W74-04075 2E

SZASZ, S. E.
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

SZLUHA, A. T.
Potamological Effects of Fish Hatchery Discharge on the Jordan River, Northern Lower Michigan,
W74-03903 5C

TALSMA, A. R.
The Characterization and Influence of Domestic Drain Effluents on the Red Cedar River,
W74-03895 5B

TAN, L.
Detection and Quantitative Measurement of Fecal Water Pollution Using a Solid-Injection Gas Chromatographic Technique and Fecal Steroids as a Chemical Index,
W74-03887 5A

TAPIL'SKAYA, L. N.
Results of Acclimatization of Corophium sowinskyi (Mart.) in the Veselovsk Reservoir, (In Russian),
W74-04099 2H

TARAN, YE. YU.
The Structural-Continuum Theory of Dilute Suspensions of Rigid Ellipsoidal Particles,
W74-04249 8B

TARASOVA, YE. N.
Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

TAREEN, I. U.
Preliminary Survey of Golcuk, A Eutrophic Mountain Lake in Western Turkey,
W74-03946 5C

TATE, C. H.
Floods of the 1970 and 1971 Water Years in Mississippi,
W74-03816 2E

TAYLOR, B. B.
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

TAYLOR, C. H.
Sediment Production in a Small Appalachian Watershed During Spring Runoff: The Eaton Basin, 1970-1972,
W74-04267 2J

TAYLOR, O. J.
Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

TEK, M. R.
Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

TEMPEST, D. W.
Phenotypic Variability of the Envelope Proteins of Klebsiella aerogenes,
W74-03882 5C

TENNER, A. R.
Laminar and Axisymmetric Vertical Jets in a Stably Stratified Environment,
W74-04224 8B

TENNEY, A. S.
Colorimetric Determination of Boron in Aqueous Solutions and in Borosilicate Glass by Solvent Extraction,
W74-03862 5A

TENORE, K. R.
Intensive Outdoor Culture of Marine Phytoplankton Enriched with Treated Sewage Effluent,
W74-04103 5D

THEURER, B.
Alfalfa Quality: Is There a Difference,
W74-03930 3F

THOMPSON, R. K.
Arizona Indian Corn (Zea mays L.),
W74-03926 3F

THORHAUG, A.
Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

THORNE, R. E.
A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

THRAPP, A. G.
Pyramid Lake Recreation Development Plan. Initial Facilities,
W74-03955 6B

TICE, A. R.
The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

TICHENOR, B. A.
Evaluation of Thermal Pollution Control Alternatives,
W74-03791 5D

TIEMEIER, O. W.
Investigations of Nutrition and Metabolism of Catfish and Utilization of Fisheries Products,
W74-03802 8I

TIMMONS, D. R.
Nitrogen and Phosphorus Losses in Surface Runoff from Agricultural Land as Influenced by Placement of Broadcast Fertilizer,
W74-04096 5C

TIMMS, B. V.
A Meromictic Lake in Australia,
W74-04101 5C

TINCHER, W. C.
Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

TIPPNER, M.
On The Extent of Bottom Erosion in Large Rivers (Ueber den Umfang der Schlenerosion in grossen Gewaessern),
W74-04252 2J

TIRRANEN, L. S.
Microflora of Nutrient Solution in Soilless Growing of Vegetable Crops, (In Russian),
W74-04235 3F

TODD, D. K.
The Future Prospects of Artificial Groundwater Recharge,
W74-03826 5D

TOERIEN, D. F.
Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

TOMAJKA, J.
Preliminary Data About the Seasonal Changes and Vertical Stratification of Periphyton from the Middle Reach of the River Danube,
W74-04294 5A

TROXLER, R. F.
Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

TSENG, C. M.
Transient Heat and Mass Transfer in Fully Developed Laminar Tube Flows,
W74-04237 8B

TSYTSUGINA, V. G.
Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

TUROVSKIY, D. S.
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

UHL, V. W. JR
Semi-Portable Sheet Metal Flume for Automated Irrigation,
W74-04138 3F

UHLIG, H. H.
Corrosion and Corrosion Control,
W74-04161 8G

ULMGREN, L.
A Programme for Studies of the Recovery of Polluted Lakes. The Effect of Chemical Sewage Treatment and Diversion of Sewage,
W74-04105 5C

UNTURA, A. A.
Primary Production of Phytoplankton and Destruction of Organic Matter in the Prut River, (In Russian),
W74-04284 5C

UPCHURCH, J. B.
Coagulation in Estuaries,
W74-04257 5B

VAN DENBURGH, A. S.
A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

VECCHIOLI, J.
Water Resources of the New Jersey Part of the Ramapo River Basin,
W74-03806 4B

VIGANI, F. C.
Problems in Phenolics-Modeling Methods in the Ohio River at Wheeling, W. Va.,
W74-03849 5A

VIRARAGHAVAN, T.
Occupationally Related Health Hazards in Wastewater Treatment Systems,
W74-03853 5C

VISKANTA, R.
Thermal Interaction of two Streams in Boundary-Layer Flow Separated by a Plate,
W74-04236 8B

VISLOGUZOV, F. S.
Field Shelterbelt Afforestation and Greenery Planting,
W74-03883 3F

VLADIMIROVA, K. S.
Organic Matter of the Soil in the Kiev Reservoir and its Role in the Development of Benthic Algae, (In Russian),
W74-04281 5C

VOLKMAR, R. D.
Primary Productivity in Relation to Chemical Parameters in Cheat Lake, West Virginia,
W74-04089 5C

VOLKVADZE, Z. A.
Effect of Weather Conditions on Sporulation of Helminothosporium turcicum Pass,
W74-04296 3F

VORACHEK, T. J.
Alfalfa Quality: Is There a Difference,
W74-03930 3F

VOROB'YEV, G. A.
Iron Ore in Lakes of Vologda Oblast (Zhelezorudnyye ozera Vologodskoy oblasti),
W74-03833 2H

WAHL, K. D.
Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

WAITES, W. M.
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

WALKER, J. N.
Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

WALKER, W. H.
Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

WALKER, W. R.
Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

WALL, J. P.
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

WALLACE, A. G.
Aerial Detection of Spill Sources,
W74-04196 5A

WARRICK, A. W.
Evaluation of Water Flux Above a Deep Water Table Using Thermocouple Psychrometers,
W74-03776 2G

WARTENBERG, K.
Pollution of Drinking Water by Oil in the Pipes of New Buildings, (In German),
W74-03950 5B

WASSERMAN, H.
Remote Control is Coming,
W74-04153 8C

WATTS, E. J.
Operation and Maintenance of Centrifugal Pumps,
W74-04146 8C

WEBB, L. M.
Wave Shoaling,
W74-04215 2E

WEBBER, T. J. N.
Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXI. Introduction and Instrumentation,
W74-03859 5A

Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXII. Symmetrical Periodic Current Differential Electrolytic Potentiometry in Oxidation - Reduction Titrimetry,
W74-03860 5A

WEINROBE, M.
Accounting for Pollution: Pollution Abatement and the National Product,
W74-03959 5G

WENNERBERG, A.-M.
Waste Water Impurity Level Affects Flocculation Efficiency of Polyelectrolytes,
W74-04195 5D

WEST, L. H.
Cathodic Protection in Congested Areas,
W74-04159 8G

WESTENDORF, W. H.
Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

WHITE, E. M.
Wind Erosion as a Factor in Soil Formation in the Pierre-Shale Landscape of Western South Dakota,
W74-03781 2J

WHITESIDES, D. V.
Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

WHITNEY, B. F.
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

WHITTOW, G. C.
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

WICK, W. Q.
Estuaries Under Attack,
W74-04033 6G

WILHM, J.
Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

WILLETT, G. S.
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

WILLIAMS, J. W.
Application of Engineering to Well Construction and Development at Vernon,
W74-04167 8B

WILLIS, R.
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

WILSON, I. G.
ERGS,
W74-04264 2J

WILSON, J. N.
Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode,
W74-03864 5A

WIRTH, T. L.
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

WISCHMEIER, W. H.
Upslope Erosion Analysis,
W74-03799 2J

WITHERSPOON, P. A.
Evaluation of Groundwater Resources in Livermore Valley, California,
W74-04201 2F

WOLFE, L.
Automatic Control of Level, Pressure, and Flow,
W74-03861 8C

WOOD, G.
Nutrient Budgets in Rivers,
W74-03947 5C

WOODARD, S. L.
Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

WOODWARD, R. L.
Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

WURTZ, C. B.
The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

WYATT, L. R.
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

YANKO, A. K.
Self-Similar Solutions for a Three-Component Axisymmetrical Flow of a Viscous Fluid,
W74-04248 8B

YARBROUGH, M. M.
Regional Interdependencies and External Diseconomies,
W74-03912 6B

YASSO, W. E.
Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2J

YEH, H. H.
Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

YEMEL'YANOV, YE. M.
Basic Types of Recent Bottom Sediments of the Mediterranean Sea, Their Mineralogy and Geochemistry (Osnovnyye tipy sovremennykh donnykh osadkov Sredizemnogo morya, ikh mineralogiya i geokhimiya),
W74-03828 2J

YEN, B. C.
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

YOTSUKURA, N.
Mechanics of Heat Transfer in Nonstratified Open-Channel Flows,
W74-03792 5B

YOUNG, H. L.
Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

YOUNG, L. L.
Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

YOUNG, R. A.
Radio System Monitors Pump Stations,
W74-04148 8G

YOUNGS, W. D.
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

ZAKORDONETS, V. A.
Hygienic Evaluation of a Machine for Applying Granulated Herbicides in Canals of the Collector-Drainage Network, (In Russian),
W74-04166 5G

ZEKOVIC, P.
Weed Control in Sugar Beet Crops in the Kosovo Region, (In Serbo-Croatian),
W74-03943 3F

ZLOBIN, V. S.
Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

ZUZEL, J. F.
Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

ORGANIZATIONAL INDEX

ABT ASSOCIATES, INC., CAMBRIDGE, MASS.
A Social Report - Man and Water, The Relationship between Social Psychological Systems and Water Resources Development,
W74-04170 6B

ADADEMIYA NAUK SSSR, KALININGRAD. INSTITUT OKEANOLOGII.
Basic Types of Recent Bottom Sediments of the Mediterranean Sea, Their Mineralogy and Geochemistry (Osnovnyye tipy sovremennykh donnykh osadkov Sredizemnogo morya, ikh mineralogiya i geokhimiya),
W74-03828 2J

ADADEMIYA NAUK SSSR, MOSCOW. GEOLOGICHESKII INSTITUT.
Distribution of Zr, Ti, Ni, Co, Pb, Cu, and Other Elements in the Surface Layer of Recent Sediments of Lake Balkhash (Raspredeleniye Zr, Ti, Ni, Co, Pb, Cu i drugihk elementov v poverkhnostnom sloye sovremennykh osa dkov oz. Balkhash),
W74-03827 2H

AEGEAN UNIV., BORNOVA (TURKEY).
Preliminary Survey of Golcuk, A Eutrophic Mountain Lake in Western Turkey,
W74-03946 5C

On Saltwater Hot Springs in the Coast Area of Western Anatolia, Turkey (Uber Salzwasser-Thermen Im Kustenland Von West-Anatolien, Turkei),
W74-04270 2F

AGRICULTURAL INST., PRISTINA (YUGOSLAVIA).
Weed Control in Sugar Beet Crops in the Kosovo Region, (In Serbo-Croatian),
W74-03943 3F

AGRICULTURAL RESEARCH COUNCIL, NORWICH (ENGLAND). FOOD RESEARCH INST.
The Effect of Hypochlorite on the Germination of Spores of Clostridium bifermentans,
W74-03841 5C

AGRICULTURAL RESEARCH SERVICE, BELTSVILLE, MD. PLANT PHYSIOLOGY INST.
Nitrate Determination by a Modified Conway Microdiffusion Method,
W74-03845 2G

AGRICULTURAL RESEARCH SERVICE, BOISE, IDAHO. NORTHWEST WATERSHED RESEARCH CENTER.
Soil Moisture Trends on Sagebrush Rangelands,
W74-04074 2G

AGRICULTURAL RESEARCH SERVICE, FORT COLLINS, COLO.
Vacuum Extractors to Assess Deep Percolation Losses and Chemical Constituents of Soil Water,
W74-03779 7B

AGRICULTURAL RESEARCH SERVICE, MORRIS, MINN. NORTH CENTRAL SOIL CONSERVATION RESEARCH CENTER.
Nitrogen and Phosphorus Losses in Surface Runoff from Agricultural Land as Influenced by Placement of Broadcast Fertilizer,
W74-04096 5C

AGRICULTURAL RESEARCH SERVICE, OXFORD, MISS. SEDIMENTATION LAB.
Determination of Fallout CS-137 and Naturally Occurring Gamma-Ray Emitters in Sediments,
W74-04190 5B

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ. WATER CONSERVATION LAB.
Water Vapor Movement Through Mulches Under Field Conditions,
W74-03784 2G

Lower Cost Water Harvesting Methods,
W74-03952 3B

Simulation of the Energy Balance of a Greenhouse,
W74-04126 2I

Wat's New in Deep-Well Injection,
W74-04265 5E

AGRICULTURAL RESEARCH SERVICE, WATKINSVILLE, GA.
Water-Sediment Splitter for Runoff Samples Containing Coarse-Grained Sediment,
W74-03780 2J

AKADEMIYA NAUK ESTONSKOI SSR, TALLINN. INST. OF EXPERIMENTAL BIOLOGY.
Effect of Environmental Factors on Algae Count in the Main Soil Types of the Estonian SSR (In Estonian),
W74-04114 2G

AKADEMIYA NAUK ESTONSKOI SSR, TARTU. INST. OF ZOOLOGY AND BIOLOGY.
Determination of Cation Capacity of Humic Acids by Thin Ash Content, (In Estonian),
W74-04299 5A

AKADEMIYA NAUK ESTONSKOI SSR, TARTU. INST. OF ZOOLOGY AND BOTANY.
Determining the Cation Capacity of Humic Substances Using Flame Photometry, (In Estonian),
W74-04298 5A

AKADEMIYA NAUK MOLDAVSKOI SSR, KISHINEV.
Spectrophotometric Determination of Hexachlorobutadiene (HCBD) in Soil and Water, (In Russian),
W74-04293 5B

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT BIOLOGII VNUTRENNYKH VOD.
Type of Spawning Grounds and Ecology of Spawning for Stint, Osmerus eperlanus (L.), in the Rybinsk Reservoir, (In Russian),
W74-04277 2H

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT GEOGRAFII.
Data of Glaciological Studies. Chronicle and Discussions (Materialy glyatsiologicheskikh issledovaniy. Khronika, Obsuzhdeniya).
W74-03835 2C

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT MIKROBIOLOGII.
Investigation of the Microflora of Swamp Ore and Lake Water by the Method of Electron Microscopy, (In Russian),
W74-04292 5A

AKADEMIYA NAUK SSSR, MOSCOW. INSTITUT RADIOTEKHNIKI I ELEKTRONIKI.
A Study of a Generalized Mathematical Model 'Predator-Sacrifice,' (In Russian),
W74-04092 2I

AKADEMIYA NAUK TADZHIKSKOI SSR, DUSHANBE. INSTITUT ZOOLOGII I PARAZITOLOGII.
Age Structure and Growth of Fish in Waters of Northern Tadzhikistan, (In Russian),
W74-04071 8I

The Feeding of Carassius auratus gibelio Bloch. From Kairakkum Reservoir, (In Russian),
W74-04109 2H

AKADEMIYA NAUK TURKMENSKOI SSR, ASHKHABAD. INSTITUT BOTANIKI.
Structure and Productivity of the Phytomass of Gigantic Bunch-Forming Grasses in the Amu Darya Floodplain, (In Russian),
W74-04282 2I

AKADEMIYA NAUK URSR, KIEV. INSTYTUT HIDROBIOLOGII.
Effect of Artificial Water Aeration on Basin Algal Flora, (In Russian),
W74-03918 5C

Exchangeable Cations in Soils of the Dnieper Reservoirs,
W74-04255 2H

Organic Matter of the Soil in the Kiev Reservoir and its Role in the Development of Benthic Algae, (In Russian),
W74-04281 5C

AKADEMIYA NAUK UZBEKSKOI SSR, TASHKENT. INSTITUT ZOOLOGII I PARAZITOLOGII.
Closed Season Regulation for Table Fish in the Sukhandar'ya River Basin, (In Russian),
W74-04290 8I

AKRON UNIV., OHIO. DEPT. OF MECHANICAL ENGINEERING.
Temperature Profiles for Turbulent Flow of High Prandtl Number Fluids,
W74-04232 8B

ALASKA UNIV., COLLEGE. DEPT. OF BIOLOGICAL SCIENCES.
Oil-Induced Mortalities in Juvenile Coho and Sockeye Salmon,
W74-03876 5C

ALASKA UNIV., COLLEGE. INST. OF WATER RESOURCES.
Alaska Water Resources Research Needs for the 70's.
W74-03757 6B

Water Balance of a Small Lake in a Permafrost Region,
W74-03758 2H

Thermal Tolerances of Interior Alaskan Arctic Grayling (Thymallus arcticus),
W74-03759 5C

ALBERTA UNIV., EDMONTON.
Regime Problems of Rivers Formed in Sediment,
W74-03789 2J

ALEXANDRIA UNIV. (EGYPT); AND KUWAIT UNIV.
Effect of Different Salinities on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Content in Ulva Fasciata Delile,
W74-04097 5C

Effect of Different Carbon Sources on Growth, Reproduction, Amino Acid Synthesis, Fat and Sugar Contents in Ulva Fasciata Delile,
W74-04098 5C

AMERICAN SOCIETY FOR TESTING AND MATERIALS, PHILADELPHIA, PA.
Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces.
W74-04156 8G

AMES LAB., IOWA.
Trace Organics In Water: Their Isolation and Identification,
W74-03848 5A

ARGONNE NATIONAL LAB., ILL.
A Technique for Simultaneous Echo Location of Fish and Thermal Plume Mapping,
W74-04229 5B

ARIZONA STATE UNIV., TEMPE.
Montezuma Well, Arizona, as a Habitat,
W74-03925 2H

ARIZONA UNIV., TUCSON.
Calcium Loss from Plant Roots During Osmotic Adjustment,
W74-03924 2I

Arizona Indian Corn (Zea mays L.),
W74-03926 3F

Alfalfa Quality: Is There a Difference,
W74-03930 3F

ARIZONA UNIV., TUCSON. DEPT. OF AGRICULTURAL ECONOMICS.
The Economics of Short-Season Cotton Production in Arizona,
W74-03928 3F

ARIZONA UNIV., TUCSON. DEPT. OF HYDROLOGY AND WATER RESOURCES.
Uncertainties in Hydrologic Models,
W74-03916 2A

ARIZONA UNIV., TUCSON. DEPT. OF SOILS, WATER AND ENGINEERING.
Evaluation of Water Flux Above a Deep Water Table Using Thermocouple Psychrometers,
W74-03776 2G

Irrigated Recreational Turfgrass with Sewage Effluent,
W74-03929 3C

ARKANSAS UNIV., FAYETTEVILLE. DEPT. OF AGRONOMY.
Self-Diffusion Coefficients of Selected Herbicides in Water and Estimates of Their Transmission Factors in Soil,
W74-03778 5B

ARKANSAS WILDLIFE FEDERATION, INC., DARDANELLE.
Water Commission Endorses User Pay Concept,
W74-04036 6E

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C.
Budget of Littoral Sands in the Vicinity of Point Arguello, California,
W74-04221 2J

ARMY ENGINEER DISTRICT, NASHVILLE, TENN.
Temporary Navigation Lock (Modification of Lock and Dam 53) (Final Environmental Impact Statement), Ohio River, Illinois and Kentucky.
W74-03966 8A

ARMY ENGINEER DISTRICT, SAN FRANCISCO, CALIF.
Oakland Inner Harbor, Alameda County, California (Final Environmental Impact Statement).
W74-04027 8A

ASIAN INST. OF TECH., BANGKOK (THAILAND).
Groundwater Recharge for Waste Water Reclamation and/or Storage of Supplies: A Cost Comparison with Conventional Methods,
W74-03825 5D

ASSOCIATED WATER AND AIR RESOURCES ENGINEERS, INC., NASHVILLE, TENN.
Studies on Uptake and Loss of Methylmercury-203 by Bluegills (Lepomis macrochirus Raf.),
W74-03839 5C

ATMOSPHERIC RESEARCH GROUP, ALTADENA, CALIF.
The Effects of Wind and Precipitation on the Modification of South Beach, Crescent City, California Including an Appendix on the Focusing of Tsunami Energy at Crescent City,
W74-04212 2E

ATOMIC ENERGY COMMISSION WASHINGTON, D.C.
The Environmental and Regulatory Aspects of the Breeder Reactor,
W74-04238 5B

AUBURN UNIV., ALA. DEPT. OF ECONOMICS.
Concepts of Externalities and Social Costs,
W74-03908 6B

Opportunity Costs and Water Resource Use,
W74-03909 6B

The Economic Impact of the Ban on Commercial Fishing on Lake Pickwick,
W74-03910 6B

Residual Information Model with Application to Heat from Thermal Power Plants,
W74-03911 5B

Regional Interdependencies and External Diseconomies,
W74-03912 6B

AUBURN UNIV., ALA. WATER RESOURCES RESEARCH INST.
The Impact of Water Pollution Abatement on Competition and Pricing in the Alabama Paper Industry,
W74-03752 5D

The Economic Benefits of Abating Water Pollution in the Steel, Textile, and Paper Industries in Alabama,
W74-03753 5D

Social Accounting Approaches to Water Resource Use in Economic Development.
W74-03907 6B

AUSSENINSTITUT FUER MOORFORSCHUNG UND ANGEWANDTE BODENKUNDE, BREMEN (WEST GERMANY).
The Role of Moors in Groundwater Recharge (Die Rolle der Moore bei der Grundwasserneubildung),
W74-04251 2F

AUSTRALIAN ATOMIC ENERGY COMMISSION RESEARCH ESTABLISHMENT, LUCAS HEIGHTS.
A Solvent-Extraction Method for the Determination of Manganese-54 in Sea Water,
W74-03886 5A

AUSTRALIAN WATER RESOURCES COUNCIL, CANBERRA.
Water Resources Newsletter, June 1973.
W74-03774 4A

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Treatment of Hazardous Material Spills with Floating Mass Transfer Media,
W74-04043 5D

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH. ENVIRONMENTAL EVALUATIONS SECTION.
Environmental Surveillance at Hanford for CY-1970,
W74-04192 5B

BECHTEL POWER CORP., GAITHERSBURG, MD.
Better Pump Installation,
W74-04154 8C

BELGIUM PHARMACEUTICAL ASSOCIATION, BRUSSELS.
Microbiological Determination of Thiram,
W74-03846 5A

BOSTON UNIV., MASS. DEPT. OF BIOCHEMISTRY.
Formation of Carbon Monoxide and Bile Pigment in Red and Blue-Green Algae,
W74-04112 5C

BRIDGEPORT HYDRAULIC CO., CONN.
Water Sampling and Laboratory Service,
W74-04024 5A

BRITISH COLUMBIA UNIV., VANCOUVER. DEPT. OF ZOOLOGY.
The Effect of Thermal Acclimation on Heart rate and Oxygen Consumption of Frogs During Submergence,
W74-04242 5A

BRITISH PETROLEUM CO. LTD., SUNBURY-ON-THAMES (ENGLAND).
Determination of Fluorine in Petroleum and Petroleum Process Catalysts with a Fluoride Electrode,
W74-03864 5A

BROCK UNIV., ST. CATHARINES (ONTARIO). DEPT. OF GEOLOGICAL SCIENCES.
Gelatin Coated Microscope Slides in Sedimentary Size Analysis,
W74-04055 2J

BROWN UNIV., PROVIDENCE, R.I. DEPT. OF GEOLOGICAL SCIENCES.
Phreatic vs. Vadose Diagenesis: Stratigraphy and Mineralogy of a Cored Borehole on Barbados, W. I.,
W74-04068 2F

BUCHAREST UNIV. (RUMANIA).
Zonation of Aquatic and Swamp Vegetation, (In Rumanian),
W74-03843 2H

BUCHAREST UNIV. (RUMANIA). FACULTY OF BIOLOGY.
Primary Productivity in the Crapina-Jijila Lake-Complex (Danube Flooded Area) During Severe Flooding,
W74-04194 5C

BULGARIAN NATIONAL COMMITTEE ON IRRIGATION AND DRAINAGE, SOFIA. WATER DEVELOPMENT DESIGN INST.
Some Data on the Water Economy and the Utilization of Water Resources in Bulgaria, Including Irrigation,
W74-03954 3F

BUNDESANSTALT FUER GEWAESSERKUNDE, COBLENZ (WEST GERMANY).
On The Extent of Bottom Erosion in Large Rivers (Ueber den Umfang der Schlenerosion in grossen Gewaessern),
W74-04252 2J

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, CANBERRA (AUSTRALIA).
Supratidal Environment and Geochemistry of Some Recent Dolomite Concretions, Broad Sound, Queensland, Australia,
W74-04069 2L

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, CANBERRA (AUSTRALIA). BAAS-BECKING GEOBIOLOGICAL LAB.
Apparatus for Studies of Artificial Sediments,
W74-04057 2J

CALIFORNIA STATE COLL., HAYWARD. DEPT. OF BIOLOGICAL SCIENCES AND HEALTH SCIENCES.
Body Heat Dissipation and Conservation in Two Species of Dolphins,
W74-04240 5C

CALIFORNIA STATE DEPT. OF WATER RESOURCES, LOS AGNELES. SOUTHERN DISTRICT.
Water Quality Cycle--Reflection of Activities of Nature and Man,
W74-04263 5B

CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO.
West Side Crop Adaptability Study.
W74-03922 3F

Pyramid Lake Recreation Development Plan. Initial Facilities,
W74-03955 6B

Los Banos Reservoir Recreation Development Plan,
W74-03956 6B

Discharge System for the A.D. Edmonston Pumping Plant,
W74-04038 3B

CALIFORNIA UNIV., BERKELEY.
The Rhein Study,
W74-03788 2J

The Future Prospects of Artificial Groundwater Recharge,
W74-03826 5D

CALIFORNIA UNIV., BERKELEY. DEPT. OF CIVIL ENGINEERING.
Evaluation of Groundwater Resources in Livermore Valley, California,
W74-04201 2F

CALIFORNIA UNIV., BERKELEY. DEPT. OF SOILS AND PLANT NUTRITION.
Uptake and Translocation of Sr by Zea mays,
W74-04187 5C

CALIFORNIA UNIV., DAVIS. DEPT. OF CIVIL ENGINEERING.
Borehole Recharge: The Compatability of Recharge Water With the Aquifer,
W74-03822 4B

CALIFORNIA UNIV., DAVIS. DEPT. OF WATER SCIENCE AND ENGINEERING.
Use of Sprinklers to Study the Influence of Population Density Upon Seed Cotton Production in an Arid Area,
W74-04133 3F

Drainage Design as Influenced by Conditions in the Vicinity of the Drain Line,
W74-04200 4A

CALIFORNIA UNIV., LOS ANGELES.
Spontaneous Vegetation of the Murray Springs Area, San Pedro Valley, Arizona,
W74-03927 2I

CALIFORNIA UNIV., RIVERSIDE. DEPT. OF WATER SCIENCE AND ENGINEERING.
Water Production Functions and Irrigation Programming for Greater Economy in Project and Irrigation System Design and for Increased Efficiency in Water Use,
W74-03920 3F

CALIFORNIA UNIV., SAN DIEGO, LA JOLLA. INST. OF MARINE RESOURCES.
Temperature and Phytoplankton Growth in the Sea,
W74-04233 5C

CALIFORNIA UNIV., SANTA BARBARA. DEPT. OF ECONOMICS.
A General Procedure for Consumption-Density Studies,
W74-04040 6D

CARNEGIE-MELLON UNIV., PITTSBURGH, PA. GRADUATE SCHOOL OF INDUSTRIAL ADMINISTRATION.
Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel,
W74-04184 5C

CARNEGIE-MELLON UNIV., PITTSBURGH, PA. MELLON INST. OF SCIENCE.
Problems in Phenolics-Modeling Methods in the Ohio River at Wheeling, W. Va.,
W74-03849 5A

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, GIF-SUR-YVETTE (FRANCE). LABORATOIRE DE GENETIQUE EVOLUTIVE ET DE BIOMETRIE.
Hydrobiological Studies of 2 Shallow Ponds: Observations on Temperature and Plankton Distribution and the Influence of a Plant Cover Containing Lemna minor, (In French),
W74-04291 2H

CH2M/HILL, CORVALLIS, OREG.
Physical-Chemical Wastewater Treatment Plant Design,
W74-03957 5D

CHARLES RIVER ASSOCIATES, INC., CAMBRIDGE, MASS.
The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part I. Introduction and Executive Summary.
W74-04081 5G

The Effects of Pollution Control on the Nonferrous Metals Industries. Copper. Part II. Structure of the Industry.
W74-04082 5G

CHASE ECONOMETRIC ASSOCIATES, INC., PHILADELPHIA, PA.
The Economic Impact of Pollution Control. An Overview, a Summary of Research Studies.
W74-04077 5G

CHELSEA COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF PHARMACY.
The Effects of Artificial Sunlight Upon Floating Oils,
W74-03777 5B

CHEVRON OIL CO., HOUSTON, TEX. GEOPHYSICAL DIV.
Encyclopedic Dictionary of Exploration Geophysics,
W74-04142 8B

CIVIL ENGINEERING ASSOCIATION, VERNON, CALIF.
Application of Engineering to Well Construction and Development at Vernon,
W74-04167 8B

CLA-VAL CO., NEWPORT BEACH, CALIF. COMMERCIAL SALES DIV.
Automatic Control of Level, Pressure, and Flow,
W74-03861 8C

CLARKSON COLL. OF TECHNOLOGY, POTSDAM, N.Y. DEPT. OF CHEMICAL ENGINEERING.
An Improved Mixing Length Theory of Turbulent Heat and Mass Transfer,
W74-04231 8B

COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N. H.
The Water-Ice Phase Composition of Clay-Water Systems: I. The Kaolinite-Water System,
W74-03783 2G

COLORADO STATE UNIV., FOR COLLINS. NATURAL RESOURCE ECOLOGY LAB.
An Ecological Description of a Semi-Arid East African Ecosystem,
W74-03923 2I

COLORADO STATE UNIV., FORT COLLINS.
River Response,
W74-03785 2E

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF AGRICULTURAL ENGINEERING.
Agricultural Impact on Water Quality in Western Rivers,
W74-03796 5B

Culverts for Flow Measurement in Irrigation Systems,
W74-04131 4A

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF AGRONOMY.
An Experimental Study of Soil Water Flow Systems Involving Hysteresis,
W74-03760 2G

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
Dispersion of Contaminants Attached to Sediment Bed Load,
W74-03797 5B

Behavior of Cohesive Material From a Soil Engineer's Viewpoint,
W74-03798 2J

Application of Remote Sensing to River Mechanics,
W74-03800 2E

Lognormal Size Distribution of Particulate Matter,
W74-04058 2J

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF FISHERY AND WILDLIFE BIOLOGY.
Fish Behavior Related to Thermal Pollution,
W74-03795 5C

COLORADO STATE UNIV., FORT COLLINS. ENGINEERING RESEARCH CENTER.
Flow Over Alluvial Bed,
W74-03786 2E

Flow Resistance over Short Simulated Vegetation and Various Tall Simulated Vegetation Groupings on Flow Resistance and Sediment Yield,
W74-03787 2E

COLUMBIA UNIV., NEW YORK. DEPT. OF GEOLOGY.
Geometry and Development of Spit-Bar Shorelines at Horseshoe Cove, Sandy Hook, New Jersey,
W74-04206 2L

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, ASPENDALE (AUSTRALIA). DIV. OF ATMOSPHERIC PHYSICS.
The Estimation of Net Radiation and Potential Evapotranspiration Using Atmometer Measurements,
W74-04129 2D

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, CRONULLA (AUSTRALIA). DIV. OF FISHERIES AND OCEANOGRAPHY; AND QUEEN'S UNIV., KINGSTON (ONTARIO). DEPT. OF BIOLOGY.
The Excretion of Organic Nitrogen by Marine Algae in Batch and Continuous Culture,
W74-04102 5C

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, GRIFFITH (AUSTRALIA). DIV. OF IRRIGATION RESEARCH.
Leaf Orientation of a Cotton Plant,
W74-04132 3F

CONNECTICUT UNIV., STORRS. DEPT. OF GEOLOGY AND GEOGRAPHY.
Mucilaginous Matrix of Some Estuarine Sands in Connecticut,
W74-04066 2L

CONSULTEC, ROCKVILLE, MD.
Fabric Boom Concept for Containment and Collection of Floating Oil,
W74-04044 5G

CORNELL UNIV., ITHACA, N. Y. WATER RESOURCES AND MARINE SCIENCES CENTER.
Trophic Level Interrelationships in Cayuga Lake, New York,
W74-03769 2H

CORPS OF ENGINEERS, WASHINGTON, D.C.
Water Renovation for Unrestricted Re-Use,
W74-04034 5D

DEPARTMENT OF MINES, WELLINGTON (NEW ZEALAND).
Silcretes and Associated Silica Diagenesis in Southern Africa and Australia,
W74-04067 2J

DEPARTMENT OF THE ENVIRONMENT, BURLINGTON (ONTARIO). CENTRE FOR INLAND WATERS.
Determination of Submicrogram Levels of Phenol in Water,
W74-03868 5A

Development of Three-Dimensional Numerical Models of the Great Lakes,
W74-04051 2H

DIVISION OF PRODUCTION AND MATERIALS MANAGEMENT (AEC), WASHINGTON, D.C.
Management of Radioactive Aqueous Wastes from AEC Fuel-Reprocessing Operations,
W74-04188 5B

DU PONT DE NEMOURS (E. I.) AND CO., WILMINGTON, DEL. ENGINEERING MATERIALS LAB.
Synergistic Inhibition of Ferric Ion Corrosion During Chemical Cleaning of Metal Surfaces,
W74-04169 8G

DUKE UNIV., DURHAM, N.C. DEPT. OF BOTANY.
North Carolina Marine Algae. II. New Records and Observations of the Benthic Offshore Flora,
W74-03885 5A

EASTERN MICHIGAN UNIV., YPSILANTI.
Ohio Mussel Fisheries Investigation. Part I: Mussel Studies. Part II: Water Chemistry and Sediment Analyses. Part III: Plankton Survey,
W74-03931 5C

Ohio Mussel Fisheries Investigation. Part I: Mussel Studies,
W74-03932 8I

Ohio Mussel Fisheries Investigation. Part II: Water Chemistry and Sediment Analyses,
W74-03933 5C

Ohio Mussel Fisheries Investigation. Part III: Plankton Survey,
W74-03934 5C

EDGEWOOD ARSENAL, ABERDEEN PROVING GROUND, MD.
Test for Anticholinesterase Materials in Water,
W74-03838 5A

EG AND G, INC., LAS VEGAS, NEV.
Aerial Radiological Measuring Survey of the Area Surrounding the Monticello Nuclear Generating Plant, Monticello, Minnesota, August 1970.
W74-04185 5B

Aerial Radiological Measuring Survey of the Area Surrounding Big Rock Point Nuclear Plant, Big Rock Point, Michigan, 1968,
W74-04186 5B

ENVIRONMENTAL HEALTH LAB., MCCLELLAN AFB, CALIF.
Loss of Mercury from Water During Storage,
W74-04048 5A

ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA. SOUTHEAST ENVIRONMENTAL RESEARCH LAB.
Environmental Applications of Advanced Instrumental Analyses: Assistance Projects, FY 72,
W74-04197 5A

ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI, OHIO. WATER SUPPLY RESEARCH LAB.
Evaluation of a Low-Cost Arsenic and Selenium Determination at Microgram-Per-Liter Levels,
W74-03851 5A

ENVIRONMENTAL PROTECTION AGENCY, COLLEGE, ALASKA. ARCTIC ENVIRONMENTAL RESEARCH LAB.
Batch Disinfection of Treated Wastewater with Chlorine at Less Than 1 deg C,
W74-04042 5D

ENVIRONMENTAL SYSTEMS CORP., KNOXVILLE, TENN.
Explicit Calibration of the PILLS II System,
W74-04198 5D

ERLANGEN-NUREMBERG UNIV. (WEST GERMANY). INST. FOR HYGIENE AND MEDICAL MIKROBIOLOGY.
Pollution of Drinking Water by Oil in the Pipes of New Buildings, (In German),
W74-03950 5B

ESSO PRODUCTION RESEARCH CO., HOUSTON, TEX.
New Single-Well Test for Determining Vertical Permeability,
W74-04150 8G

ESSO RESEARCH AND ENGINEERING CO., FLORHAM PARK, N.J.
Laminar and Axisymmetric Vertical Jets in a Stably Stratified Environment,
W74-04224 8B

EUROPEAN ATOMIC ENERGY COMMUNITY, ISPRA (ITALY). BIOLOGY DIV.
Chlorophyll-A and Phaeophytin: Their Relationships with the Concentrations of Nitrogen and Phosphorus in the Seston of Lake Monate (North Italy), (In Italian),
W74-04300 5C

EUROPEAN ATOMIC ENERGY COMMUNITY, ISPRA (ITALY). JOINT NUCLEAR RESEARCH CENTER.
Environmental Radioactivity - Ispra 1971,
W74-04176 5B

EXETER UNIV. (ENGLAND). DEPT. OF CHEMISTRY.
Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXI. Introduction and Instrumentation,
W74-03859 5A

Differential Electrolytic Potentiometry with Periodic Polarisation. Part XXII. Symmetrical Periodic Current Differential Electrolytic Potentiometry in Oxidation - Reduction Titrimetry,
W74-03860 5A

FLORIDA UNIV., GAINESVILLE. DEPT. OF BOTANY.
Thermophilic Fungi in a Municipal Waste Compost System,
W74-03875 5A

FLORIDA UNIV., GAINESVILLE. DEPT. OF ENVIRONMENTAL ENGINEERING SCIENCES.
Water Resources and Social Choices,
W74-03951 6B

Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant: An Ecological Approach,
W74-04173 5B

FLORIDA UNIV., GAINESVILLE. DEPT. OF PHYSIOLOGY.
Heating and Cooling Rates in Four Species of Turtles,
W74-04243 5C

FOREST SERVICE (USDA), FORT COLLINS, COLO. ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Fire Climates in the Southwest,
W74-04130 4A

GENERAL ELECTRIC CO., CLEVELAND, OHIO.
A Systematic Approach to the Analysis of Means. Part II. Analysis of Contrasts. Part III. Analysis of Non-Normal Data,
W74-03837 7C

GENERAL ELECTRIC CO., PHILADELPHIA, PA. RE-ENTRY AND ENVIRONMENTAL SYSTEMS DIV.
An Application Study in Water Distribution Control,
W74-03755 8C

GENERAL ELECTRIC CORPORATE RESEARCH AND DEVELOPMENT, SCHENECTADY, N.Y.
A Survey of Prediction Intervals and Their Applications,
W74-03858 7C

Colorimetric Determination of Boron in Aqueous Solutions and in Borosilicate Glass by Solvent Extraction,
W74-03862 5A

GEOLOGICAL SURVEY, ALBANY, N.Y.
Chemical Quality of Surface Water in the Eastern Oswego River Basin, New York,
W74-03817 5A

GEOLOGICAL SURVEY, ANCHORAGE, ALASKA.
Field Water-Quality Information Along the Proposed Trans-Alaska Pipeline Corridor, September 1970 Through September 1972,
W74-04054 5A

GEOLOGICAL SURVEY, ATLANTA, GA.
Dewatering of the Clayton Formation During Construction of the Walter F. George Lock and Dam, Fort Gaines, Clay County, Georgia,
W74-03819 4B

GEOLOGICAL SURVEY, AUSTIN, TEX.
Annual Compilation and Analysis of Hydrologic Data for Elm Fork Trinity River, Trinity River Basin, Texas, 1971,
W74-03818 2E

GEOLOGICAL SURVEY, BAY ST. LOUIS, MISS.
Mechanics of Heat Transfer in Nonstratified Open-Channel Flows,
W74-03792 5B

Discharge and Flow Distribution, Columbia River Estuary,
W74-04172 5B

GEOLOGICAL SURVEY, CARSON CITY, NEV.
A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,
W74-04047 4A

A Reconnaissance of Streamflow and Fluvial Sediment Transport, Incline Village Area, Lake Tahoe, Nevada, Second Progress Report 1971,
W74-04050 2J

GEOLOGICAL SURVEY, CORPUS CHRISTI, TEX.
Pseudo-Crosslamination Formed by Climbing Adhesion Ripples,
W74-04062 2J

GEOLOGICAL SURVEY, DENVER, COLO.
Water-Level Declines and Ground-Water Quality, Upper Black Squirrel Creek Basin, Colorado,
W74-03808 4B

GEOLOGICAL SURVEY, DENVER, COLO. OFFICE OF ENERGY RESOURCES.
Determination of Organic Carbon in Modern Carbonate Sediments,
W74-04059 2J

GEOLOGICAL SURVEY, DENVER, COLO. WATER RESOURCES DIV.
Stability Field Diagrams as Aids in Iron Chemistry Studies,
W74-04163 2K

GEOLOGICAL SURVEY, FORT COLLINS, COLO.
Suspended-Sediment Sampling Variability,
W74-03801 2J

GEOLOGICAL SURVEY, HURON, S. DAK.
Statement of Progress on Investigation and Analysis of Flood Hydrographs from Small Drainage Basins in South Dakota,
W74-03821 4A

GEOLOGICAL SURVEY, INDIANAPOLIS, IND.
Hydrogeology of the Principal Aquifers in Sullivan and Greene Counties, Indiana,
W74-04049 2F

GEOLOGICAL SURVEY, IOWA CITY, IOWA.
Floods in Iowa: Technical Manual for Estimating Their Magnitude and Frequency,
W74-03805 4A

GEOLOGICAL SURVEY, JACKSON, MISS.
Floods of the 1970 and 1971 Water Years in Mississippi,
W74-03816 2E

GEOLOGICAL SURVEY, LINCOLN, NEBR.
Selenium in Nebraska's Groundwater and Streams,
W74-03813 5B

GEOLOGICAL SURVEY, LITTLE ROCK, ARK.
Clogging in Recharge Wells, Causes and Cures,
W74-03824 4B

GEOLOGICAL SURVEY, MENLO PARK, CALIF.
Groundwater Data in Santa Barbara and Southern San Luis Obispo Counties, California, Spring 1970 to Spring 1973,
W74-03814 4B

GEOLOGICAL SURVEY, MIAMI, FLA.
Effects of the Feeder Canal on the Water Resources of the Fort Lauderdale Prospect Well-Field Area,
W74-04259 5G

GEOLOGICAL SURVEY OF ALABAMA, UNIVERSITY.
Water Availability and Geology in Marion County, Alabama,
W74-03810 4B

Water Availability in Mobile County, Alabama,
W74-03811 4B

GEOLOGICAL SURVEY OF SOUTH AUSTRALIA, ADELAIDE.
The Significance of Ion Exchange to Interstitial Solutions in Clayey Sediments,
W74-04268 2K

GEOLOGICAL SURVEY OF SWEDEN, STOCKHOLM.
Variation of Groundwater Levels and a Calculation of the Effective Fissure Porosity at the File Hajdar, Gotland,
W74-04260 2F

GEOLOGICAL SURVEY, PORTLAND, OREG.
Flood Profiles in the Umpqua River Basin, Oregon, Part 2,
W74-03803 4A

GEOLOGICAL SURVEY, PUEBLO, COLO.
Water-Management Studies of a Stream-Aquifer System, Arkansas River Valley, Colorado,
W74-04262 4B

GEOLOGICAL SURVEY, RESTON, VA.
Effects of Pumping from the Ohio River Valley Alluvium Between Carrollton and Ghent, Kentucky,
W74-04155 4B

GEOLOGICAL SURVEY, TACOMA, WASH.
Appraisal of Ground-Water Availability and Management Projections, Walla Walla River Basin, Washington and Oregon,
W74-03812 4B

GEOLOGICAL SURVEY, TALLAHASSEE, FLA.
Effects on Water Quality in the Shallow Aquifer due to the Operation of the Cross State Dump, Palm Beach County, Florida,
W74-04052 5B

GEOLOGICAL SURVEY, TUSCALOOSA, ALA.
Water Resources Monitoring and Evaluation--A Key to Environmental Protection in Alabama Oil Fields,
W74-03807 5B

GEOLOGICAL SURVEY, WASHINGTON, D.C.
Water Resources of the New Jersey Part of the Ramapo River Basin,
W74-03806 4B

Water Resources of the Northern Cheyenne Indian Reservation and Adjacent Area, Southeastern Montana,
W74-03809 7C

Cost Analysis of Groundwater Supplies in the North Atlantic Region, 1970,
W74-03815 4B

Base of Fresh Ground Water (Approximately 3,000 Micromhos) in the San Joaquin Valley, California),
W74-04274 7C

Water Resources of Wisconsin, St. Croix River Basin,
W74-04275 7C

GEORGIA INST. OF TECH., ATLANTA. ENVIRONMENTAL RESOURCES CENTER.
Community Well-Being as a Factor in Urban Land Use Planning,
W74-03751 6B

Effect of Polyester Fiber Processing Effluents on Water Quality,
W74-03761 5A

The Interaction of Water with Organic Solute Species,
W74-03762 1B

GESELLSCHAFT FUER KERNFORSCHUNG M.B.H., KARLSRUHE (WEST GERMANY).
Disposal of Radioactive Wastes into the Underground in the Federal Republic of Germany - A Survey on Practical Experience and R and D Work,
W74-04171 5E

GORKII STATE UNIV. (USSR). DEPT. OF ZOOLOGY.
Primary Production and Destruction of Organic Matter in 2 Lakes of Different Types, (In Russian),
W74-03944 5C

GOSUDARSTVENNYI GIDROLOGICHESKII INSTITUT, LENINGRAD (USSR).
Problems in Mathematical Modeling of Hydrologic Processes (Voprosy matematicheskogo modelirovaniya gidrologicheskikh protsessov).
W74-03830 2A

Application of Statistical Methods in Hydrology (Primeneniye statisticheskikh metodov v gidrologii).
W74-03831 6B

GOSUDARSTVENNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT OZERNOGO I RECHNOGO RYBNOGO KHOZYAISTVA, LENINGRAD (USSR).
Diet of the Mesocyclops leuckarti (Claus) and Leptodora kindtii (Focke) Populations in Lake Ilmen, (In Russian),
W74-04091 2H

GULF GENERAL ATOMIC CO., SAN DIEGO, CALIF.
The Direct-Cycle Nuclear Gas Turbine with Economical Dry Air Cooling,
W74-04230 5D

HARYANA AGRICULTURAL UNIV., HISSAR (INDIA). DEPT. OF AGRONOMY.
Dry Land Research in Northwest India. I: Effect of Variable Pre-Planting Tillage on Soil Moisture, Growth, and Yield of Pearl Millet (Pennisetum typhoides, S. and H),
W74-04128 3F

HAWAII UNIV., HONOLULU. DEPT. OF ZOOLOGY.
The Effect of Changes in Ambient Temperature on Spontaneous Activity in Skipjack Tuna,
W74-04241 5C

HEBREW UNIV., REHOVOTH (ISRAEL). DEPT. OF SOIL AND WATER SCIENCE.
Some Aspects of the Ca and Sr Weathering Cycle in the Lake Kinneret (Lake Tiberias) Drainage Basin,
W74-04269 2J

HINCHMAN CORP., DETROIT, MICH.
Cathodic Protection in Congested Areas,
W74-04159 8G

HULL UNIV. (ENGLAND). DEPT. OF ZOOLOGY.
Effects of Temperature Change on Irrigation Rate in Arenicola marina (L.),
W74-04225 5C

IFE UNIV. (NIGERIA). DEPT. OF GEOLOGY.
ERGS,
W74-04264 2J

ILLINOIS STATE WATER SURVEY, URBANA.
Pilot Scale Investigations of Well Recharge Using Cored Samples,
W74-03823 5D

Farm Ground Water Nitrate Pollution - A Case Study,
W74-04158 5B

ILLINOIS UNIV., URBANA. DEPT. OF AGRICULTURAL ENGINEERING.
Selecting a Method for Scheduling Irrigation, Using a Simulation Model.
W74-04134 3F

ILLINOIS UNIV., URBANA. DEPT. OF AGRONOMY.
Drought-Affected Mitochondrial Processes as Related to Tissue and Whole Plant Responses,
W74-04127 3F

ILLINOIS UNIV., URBANA. DEPT. OF CIVIL ENGINEERING.
Illinois Storm Sewer System Simulation Model: User's Manual,
W74-03763 5D

ILLINOIS UNIV., URBANA. DEPT. OF ECONOMICS.
Externalities, Shadow Prices, and Benefit-Cost Calculations,
W74-03960 6B

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF GEOLOGY.
The Influence of Suspended Particles on the Precipitation of Iron in Natural Waters,
W74-04272 5B

INDIANA UNIV., BLOOMINGTON. DEPT. OF ANATOMY AND PHYSIOLOGY.
Seasonal Variation in Heart Rate Response to Core Temperature Changes,
W74-04244 5C

INSTITUT FIZIKI, KRASNOYARSK (USSR).
Microflora of Nutrient Solution in Soilless Growing of Vegetable Crops, (In Russian),
W74-04235 3F

INSTITUT FRANCAIS DU PETROLE, DES CARBURANTS ET LUBRIFIANTS, RUEIL-MALMAISON (FRANCE).
A Numerical Model of Multiphase Flow Around a Well,
W74-04258 4B

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE, MONTPELLIER (FRANCE). SERVICE D'ETUDE DES SOLS.
Seasonal Variations of the Salinity in Some Profiles and in the Water Table of the Sodic Soils of Camargue: Preliminary Results (In French),
W74-04124 2G

INSTITUTE OF GEOGRAPHY OF SIBERIA AND THE FAR EAST, IRKUTSK (USSR).
Statistical Characteristics of Thunderstorms in Yakutsk Assr (Statisticheskiye kharakteristiki groz Yakutii),
W74-04253 2B

Division of the Cisbaykal Region into Zones on the Basis of Moisture and Heat Availability (Rayonirovaniye territorii Predbaykal'ya po stepeni uvlazhneniya i teploobespechennosti),
W74-04254 2G

INSTYTUT RYBACTWA SRODLADOWEGO, ZABIENIEC (POLAND). DEPT. OF FISH CULTURE.
Use of Phytophagous Fish to Control Aquatic Plants,
W74-04106 3B

INTERNATIONAL LAB. OF MARINE RADIOACTIVITY, MONTE CARLO (MONACO).
Flux of Ce-141 Through a Euphausiid Crustacean,
W74-04191 5C

INTERSTATE COMMISSION ON THE POTOMAC RIVER BASIN, BETHESDA, MD.
The Potomac, Water Quality Planning.
W74-03977 5G

IOWA UNIV., IOWA CITY. INST. OF HYDRAULIC RESEARCH.
Natural Mixing Processes in Rivers,
W74-03790 5B

Sequential Stochastic Optimization for Reservoir System,
W74-03914 4A

IOWA UNIV., IOWA CITY. STATE HYGIENIC LAB.
Formation of Pentafluorobenzyl Derivatives for the Identification and Quantitation of Acid and Phenol Pesticide Residues,
W74-03850 5A

KANSAS STATE UNIV., MANHATTAN.
Investigations of Nutrition and Metabolism of Catfish and Utilization of Fisheries Products,
W74-03802 8I

KANSAS STATE UNIV., MANHATTAN. DEPT. OF ECONOMICS.
The Ground-Water Depletion Allowance Under the Federal Income Tax,
W74-03962 6E

KENTUCKY UNIV., LEXINGTON. DEPT. OF AGRICULTURAL ENGINEERING.
Surface Water Storage Capacity of Selected Crop Leaves Under Irrigation Sprays,
W74-04135 3F

KENTUCKY WATER RESOURCES INST., LEXINGTON.
Process Control of Activated Sludge Treatment,
W74-03764 5D

KHARKOV STATE UNIV. (USSR). DEPT. OF LOWER PLANTS.
Yellow-Green Algae of Wastes, (In Ukranian),
W74-03919 5A

KIEV STATE UNIV. (USSR).
The Structural-Continuum Theory of Dilute Suspensions of Rigid Ellipsoidal Particles,
W74-04249 8B

KINNERET LIMNOLOGY LAB., TIBERIAS (ISRAEL).
Lake Kinneret: Planktonic Populations During Seasons of High and Low Phosphorus Availability,
W74-03937 5C

KOKAK (AUSTRALASIA) PTY LTD., COBURG (AUSTRALIA). RESEARCH LABS.
Simultaneous Determination of Ferrocyanide and Ferricyanide in Aqueous Solutions Using Infrared Spectrometry,
W74-03866 5A

KONINKLIJKE-SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM, RIJSWIJK (NETHERLANDS).
Filtration Behavior of Circulating Drilling Fluids,
W74-04141 8B

LAYNE AND BOWLER, INC., MEMPHIS, TENN.
Well Grouting and Well Protection,
W74-04164 8F

LENINGRAD STATE UNIV. (USSR).
Recent Sediments of the Pacific Ocean Off the Coasts of Peru and Chile (Sovremennyye osadki Tikhogo okeana u beregov Peru i Chili),
W74-03829 2J

LIMNOLOGICHESKII INSTITUT, IRKUTSK (USSR).
Correlation of Organic Carbon with Different Kinds of Oxidizability in the Open Waters of Lake Baikal,
W74-04256 2H

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS.
Economic Impact of Anticipated Paper Industry Pollution-Abatement Costs. Part III. Economic Analysis.
W74-04078 5G

LOUGHBOROUGH UNIV. OF TECHNOLOGY (ENGLAND). DEPT. OF CHEMISTRY.
Stability of Dilute Standard Solutions of Antimony, Arsenic, Iron and Rhenium Used in Colorimetry,
W74-03842 2K

LOUISIANA STATE UNIV., BATON ROUGE. COASTAL STUDIES INST.
Measurements of Beach Process Variables, Outer Banks, North Carolina,
W74-04205 2J

LOUISIANA STATE UNIV., BATON ROUGE. DEPT. OF PETROLEUM ENGINEERING.
The Effect of Flux and Gravitational Forces on Miscible Displacement in a Thin Homogeneous Bed,
W74-03896 2F

MALCOLM PIRNIE, INC., WHITE PLAINS, N.Y.
Remote Control is Coming,
W74-04153 8C

MARTIN MARIETTA CORP., DENVER, COLO.
Water Recovery and Solid Waste Processing for Aerospace and Domestic Applications.
W74-04053 5D

MASSACHUSETTS DEPT. OF PUBLIC HEALTH, BOSTON. DIV. OF ENVIRONMENTAL HEALTH.
Phosphates and the Environment,
W74-04107 5C

MASSACHUSETTS DEPT. OF PUBLIC WORKS, WELLESLEY HILLS. RESEARCH AND MATERIALS SECTION.
Effects of Deicing Chemicals Upon Ground and Surface Waters (Initial Program Development),
W74-04149 5B

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Nuclear Spin-Lattice Relaxation of Liquids Confined in Porous Solids,
W74-04157 2F

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. CORROSION LAB.
Corrosion and Corrosion Control,
W74-04161 8G

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF EARTH AND PLANETARY SCIENCES.
Flume Experiments on the Transition from Ripples to Lower Flat Bed with Increasing Sand Size,
W74-04063 2J

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF METEOROLOGY.
Wind Tunnel Measurements of the Wind Disturbance Field of a Model of the Buzzards Bay Entrance Light Tower,
W74-04207 2L

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. HYDRODYNAMICS LAB.
Theoretical Study of Longshore Currents on a Plane Beach,
W74-04214 2E

MASSEY UNIV., PALMERSTON NORTH (NEW ZEALAND). DEPT. OF CHEMISTRY AND BIOCHEMISTRY.
Instrumental Parameters for Determination of Mercury by Flameless Atomic Absorption Spectrophotometry,
W74-03844 5A

MCDONNELL AIRCRAFT CO., ST. LOUIS, MO. RECONNAISSANCE LAB.
Aerial Detection of Spill Sources,
W74-04196 5A

MCGILL UNIV., MONTREAL (QUEBEC). DEPT. OF GEOGRAPHY.
Sediment Production in a Small Appalachian Watershed During Spring Runoff: The Eaton Basin, 1970-1972,
W74-04267 2J

MEDICAL ACADEMY, GDANSK (POLAND). DEPT. OF BROMATOLOGY.
Improvements in the Wet Oxidation-Dithizone Method for Determining Low Mercury Levels in Food,
W74-03869 5A

MELBOURNE UNIV., PARKVILLE (AUSTRALIA). DEPT. OF PHYSICAL CHEMISTRY.
Direct Determination of Sulfide by Rapid Direct Current Polarography,
W74-03865 2K

METROPOLITAN WATER BOARD, WEST MOLESEY (ENGLAND). QUEEN ELIZABETH II RESERVOIR.
The Application of Fundamental Limnological Research in Water Supply System Design and Management,
W74-04111 5C

MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF ECONOMICS.
Accounting for Pollution: Pollution Abatement and the National Product,
W74-03959 5G

MICHIGAN STATE UNIV., EAST LANSING. DEPT. OF FISHERIES AND WILDLIFE.
The Characterization and Influence of Domestic Drain Effluents on the Red Cedar River,
W74-03895 5B

A Comparison of Invertebrate Drift in Three Michigan Streams,
W74-03902 5B

Potamological Effects of Fish Hatchery Discharge on the Jordan River, Northern Lower Michigan,
W74-03903 5C

The Dynamics of Brown Trout (Salmo trutta) and Sculpin (Cottus spp.) Populations as Indicators of Eutrophication,
W74-03904 5C

Benthic Macroinvertebrate Diversity in Three Differentially Perturbed Michigan Streams,
W74-03905 5C

An Ecological Evaluation of a Thermal Discharge. Part II: The Distribution of Phytoplankton and Primary Productivity Near the Western Shore of Lake Erie,
W74-03936 5C

An Ecological Evaluation of a Thermal Discharge. Part III: The Distribution of Zooplankton Along the Western Shore of Lake Erie,
W74-04095 5C

MICHIGAN STATE UNIV., HICKORY CORNERS. W. K. KELLOGG BIOLOGICAL STATION.
Increasing the Processing Rate of Particulate Organic Matter in Streams,
W74-04202 5B

MICHIGAN UNIV., ANN ARBOR.
Effect of Adjacent Expansible Fluids and Caprock Leakage on Buildup and Drawdown Behavior of Wells in an Aquifer,
W74-04152 4B

MICROBIOLOGICAL RESEARCH ESTABLISHMENT, SALISBURY (ENGLAND).
Phenotypic Variability of the Envelope Proteins of Klebsiella aerogenes,
W74-03882 5C

MID-AMERICA NAZARENE COLL., OLATHE, KANS.
Effect of Phenol on Oxygen Uptake Rate of a Laboratory Population of Chironomus attenuatus (Walk.),
W74-03872 5C

MINNESOTA UNIV., MINNEAPOLIS. ST. ANTHONY FALLS HYDRAULIC LAB.
Heated Surface Discharges into Flowing Ambient Streams and Lakes,
W74-03794 5D

MOBIL RESEARCH AND DEVELOPMENT CORP., DALLAS, TEX.
A Method for Determining the Static Pressure of a Well from Buildup Data,
W74-04162 8G

MONASH UNIV., CLAYTON (AUSTRALIA). DEPT. OF ZOOLOGY.
A Meromictic Lake in Australia,
W74-04101 5C

MONTANA STATE UNIV., BOZEMAN. DEPT. OF CHEMISTRY.
Cation Adsorption and Desorption Rates in Natural Water Studies,
W74-03765 5A

MONTANA UNIV., MISSOULA. SCHOOL OF FORESTRY.
Precipitation as a Nutrient and Hydrogen Ion Source for Forested Watersheds in the Missoula Vicinity,
W74-03766 5B

MOSCOW STATE UNIV. (USSR).
Some Environmental Factors Determining the Primary Production of the Mozhaisk Reservoir, (In Russian),
W74-03939 5C

MOSCOW STATE UNIV. (USSR). DEPT. OF GEOBOTANY.
Annual Increase of Aboveground Phytomass of Some Tundra Shrubs, (In Russian),
W74-04286 2I

MOSCOW STATE UNIV. (USSR). FACULTY OF BIOLOGY AND SOIL SCIENCE.
Some Aspects of the Theory of Exploitation of Fish Resources, (In Russian),
W74-04278 8I

MOSS LANDING MARINE LABS., CALIF.
Monterey Bay Bibliography.
W74-04218 2L

Monterey Bay Bibliography. Supplement Number One.
W74-04219 2L

MOSUL UNIV. (IRAQ). DEPT. OF CHEMISTRY.
Absorptiometric Determination of Trace Amounts of Sulphide Ion in Water,
W74-04072 5A

MOUND LAB., MIAMISBURG, OHIO.
Interim Environmental Monitoring Report: January-June 1973,
W74-04174 5A

NANCY UNIV. (FRANCE). LABORATOIRE DE BIOLOGIE VEGETALE.
The Diatomaceous Populations in the Basin of the Meurthe River: Attempt at an Hydrobiological Synthesis, (In French),
W74-04288 2I

NATAL UNIV., PIETERMARITSBURG (SOUTH AFRICA). DEPT. PASTURE SCIENCE AND AGROMETEOROLOGY.
Effect of Moisture Stress Upon Maize Production and Its Economic Significance,
W74-03948 3F

NATIONAL AGRICULTURAL RESEARCH LAB., NAIROBI (KENYA).
Gypsum as Improver of the Permeability of Grumusol (Typic Pellustert) in the Kano Plains of Kenya,
W74-04193 2G

NATIONAL AREA DEVELOPMENT INST. OF SPINDLETOP RESEARCH INC., LEXINGTON, KY.
Improving Water Quality Management Planning in Nonmetropolitan Areas.
W74-04199 5G

NATIONAL CHEMICAL LAB., TEDDINGTON (ENGLAND).
Corrosion and its Prevention in Waters,
W74-04151 8G

NATIONAL ENGINEERING SCIENCE CO., PASADENA, CALIF.
On Wind Tides and Longshore Currents Over the Continental Shelf Due to Winds Blowing at an Angle to the Coast,
W74-04210 2E

Wave Shoaling,
W74-04215 2E

Wave Shoaling,
W74-04216 2E

On the Breaking of Waves Arriving at an Angle to the Shore,
W74-04217 2H

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO.
An Investment Decision Model for Control Technology,
W74-04079 5G

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO. ADVANCED WASTE TREATMENT RESEARCH LAB.
Digital Computer Programs for the Cost Engineer.
W74-04087 5D

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CORVALLIS, OREG.
Evaluation of Thermal Pollution Control Alternatives,
W74-03791 5D

NATIONAL INST. FOR WATER RESEARCH, PRETORIA (SOUTH AFRICA).
Algal Growth Prediction Using Growth Kinetic Constants,
W74-03871 5C

NATIONAL SWEDISH ENVIRONMENT PROTECTION BOARD, STOCKHOLM.
A Programme for Studies of the Recovery of Polluted Lakes. The Effect of Chemical Sewage Treatment and Diversion of Sewage,
W74-04105 5C

NATIONAL WATER QUALITY LAB., DULUTH, MINN.
Chronic Toxicity of a Copper, Cadmium and Zinc Mixture to the Fathead Minnow (Pimephales promelas Rafinesque),
W74-03873 5C

Effect of Low Oxygen Concentration on Survival and Emergence of Aquatic Insects,
W74-04100 5C

NATIONAL WILDLIFE FEDERATION, WASHINGTON, D.C.
Catastrophe Brewing in Quiet Waters,
W74-04025 5B

NAVAL ACADEMY, ANNAPOLIS, MD.
Time Dependent Shear Stress Beneath a Shoaling Wave,
W74-04213 2J

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Storms Causing Harbor and Shoreline Damage Through Wind and Waves Near Monterey, California,
W74-04208 2J

An Investigation of Bottom Changes in Monterey Harbor (1932-1969),
W74-04211 2L

Fine Structure Measurement of Temperature and Moisture Over the Monterey Bay,
W74-04222 2L

An Oceanographic Investigation of Thermal Changes in Monterey Bay, California, September 1971 - January 1972,
W74-04223 2L

NEBRASKA UNIV., LINCOLN. COLL. OF ENGINEERING AND ARCHITECTURE.
Movement of Nitrates Under Irrigated Agriculture,
W74-04139 5B

NETHERLANDS SCHOOL OF ECONOMICS, ROTTERDAM.
Some Models for the Economic Evaluation of the Environment,
W74-04083 5G

Economic and Social Projects with Environmental Repercussions: A Shadow Project Approach,
W74-04085 6B

NEW HAMPSHIRE UNIV., DURHAM. DEPT. OF CHEMISTRY.
A Feasibility Study of a Research Program on the Source, Degradative Removal and Secondary Consequences of Petroleum Products in Water,
W74-03767 5A

NEW MEXICO INST. OF MINING AND TECHNOLOGY, SOCORRO. DEPT. OF CHEMISTRY.
Mercury: Uptake by the Goldfish, Carassius auratus, from Low Concentrations in Water and Its Tissue Distribution,
W74-03898 5C

NEW MEXICO UNIV., ALBUQUERQUE. DEPT. OF BIOLOGY.
A Study of Mercurials in the Elephant Butte Reservoir Ecosystem,
W74-03899 5C

NEW YORK INST. OF OCEAN RESOURCES, N.Y.
A Model of Salt Intrusion in a Partially Mixed Estuary,
W74-04204 5B

NEW YORK OPERATIONS OFFICE (AEC), N.Y. HEALTH AND SAFETY LAB.
Comparison of Measured and Calculated Radiation Exposure from a Boiling Water Reactor Plume,
W74-04175 5B

NEW YORK STATE COLL. OF AGRICULTURAL AND LIFE SCIENCES, ITHACA.
Distributional Impacts of Environmental Quality Management: The Case of Federal Grants for Water Pollution Control,
W74-03894 5D

NICOLAS COPERNICUS UNIV. OF TORUN (POLAND). INST. OF BIOLOGY.
Utilization of Aromatic Compounds by Benthic Microorganisms of a Eutrophic Lake,
W74-04295 5C

NORSK INSTITUUT FOR VANNFORSKNING, BLINDERN.
Algae from Some Lakes in Nordmarka Near Oslo,
W74-04289 2H

NORTH CAROLINA UNIV., CHAPEL HILL. DEPT. OF ENVIRONMENTAL SCIENCES AND ENGINEERING.
Water-Supply Planning in Developing Countries,
W74-04117 6A

Coagulation in Estuaries,
W74-04257 5B

NORTH DAKOTA STATE UNIV., FARGO. DEPT. OF ZOOLOGY.
Causes and Control of Algal Blooms in Spiritwood Lake, North Dakota,
W74-03906 5C

NORTHERN FOREST RESEARCH CENTER, EDMONTON (ALBERTA).
A Landscape Zonation for the Southern and Central Mackenzie River Valley Based on Terrain Permafrost Characteristics,
W74-04266 2C

NORTHWESTERN UNIV., EVANSTON, ILL. TECHNOLOGICAL INST.
Consolidation Characteristics of Dredging Slurries,
W74-03847 5A

NOVA SCOTIA TECHNICAL COLL., HALIFAX.
Changes in Chemical Composition and Physical Properties of a Heavy Residual Oil Weathering Under Natural Conditions,
W74-03877 5B

NUKLEARNI INSTITUT JOZEF STEFAN, LJUBLJANA (YUGOSLAVIA).
Application of the Carbon Cup Atomisation Technique in Water Analysis by Atomic-Absorption Spectroscopy,
W74-04073 5A

OAK RIDGE NATIONAL LAB., TENN.
An Electrochemical Method for Monitoring the Oxygen Content of Aqueous Streams at the Part-Per-Billion Level,
W74-04104 5A

Dose Estimations for the Hypothetical Use of Nuclearly Stimulated Natural Gas in the Cherokee Steam Electric Station, Denver, Colorado,
W74-04177 5B

OFFICE DE LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE OUTRE-MER, CAYENNE (FRENCH GUIANA). CENTRE ORSTOM DE CAYENNE.
Architecture of Riparian Forest Vegetation of Rivers and Creeks of French Guiana,
W74-04285 2I

OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF AGRICULTURAL ENGINEERING.
Semi-Portable Sheet Metal Flume for Automated Irrigation,
W74-04138 3F

OREGON STATE UNIV., CORVALLIS. DEPT. OF CIVIL ENGINEERING.
Indications of Streambed Degradation in the Willamette Valley,
W74-03770 2J

OREGON STATE UNIV., CORVALLIS. SCHOOL OF OCEANOGRAPHY.
An Occurrence of 'Brick Pattern' Oscillatory Ripple Marks at Mono Lake, California,
W74-04064 2J

The Threshold of Sediment Movement Under Oscillatory Water Waves,
W74-04065 2J

OREGON STATE UNIV. EXTENSION SERVICE, CORVALLIS. MARINE ADVISORY PROGRAM.
Estuaries Under Attack,
W74-04033 6G

ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, PARIS (FRANCE). WATER MANAGEMENT SECTION GROUP.
Summary Report of the Agreed Monitoring Projects on Eutrophication of Waters.
W74-03940 5C

OSLO UNIV. (NORWAY). INST. OF ECONOMICS.
Externalities, Environmental Pollution and Allocation in Space: A General Equilibrium Approach,
W74-04084 5G

OTTAWA UNIV. (ONTARIO).
Occupationally Related Health Hazards in Wastewater Treatment Systems,
W74-03853 5C

OTTAWA UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Computer-Assisted Activated Sludge Plant Operation,
W74-04119 5D

OXFORD UNIV. (ENGLAND). SCHOOL OF BOTANY.
The Relation Between the Synthesis of Inorganic Polyphosphate and Phosphate Uptake by Chlorella Vulgaris,
W74-04094 5C

PAN AMERICAN PETROLEUM CORP., TULSA, OKLA.
Transient Pressure Testing of Fractured Water Injection Wells,
W74-04147 8G

PENNSYLVANIA POWER AND LIGHT CO., ALLENTOWN.
The Effect of the Brunner Island Steam Electric Station's Condenser Discharge Water on the Aquatic Life in the Susquehanna River,
W74-04228 5C

POLARNYI NAUCHNO-ISSLEDOVATELSKII I PROEKTNYI INSTITUT MORSKOGO RYBNOGO KHOZYAISTVA I OKEANOGRAFII, MURMANSK (USSR).
Effect of Incorporated Radionuclides on the Chromosomal Apparatus of Marine Fish,
W74-04183 5C

POLSKIE TOWARZYSTWO PRZYRODNIKOW IM. KOPERNIKA, WARSAW.
Protection of Saprophytes as the Main Factor in a Program for Protection of Water Environments, (In Polish),
W74-04297 5G

POLYARNYI NAUCHNO-ISSLEDOVATELSKII I PROEKTNYI INSTITUT MORSKOGO RYBNOGO KHOZYAISTVA I OKEANOGRAFII, MURMANSK (USSR).
Active Phase of Assimilation of Plutonium-239 By the Marine Algae Ascophyllum nodosum,
W74-04178 5C

Photosynthesis and the Mechanism of the Action of Cyanide on Cell Respiration and Plutonium-239 Accumulation by Marine Algae,
W74-04179 5C

Radiation Reaction of the Adenohypophysis-Gonads System in Cold-Blooded Animals,
W74-04180 5C

Effect of X-Irradiation on the Incorporation of Glycine-C14 in the Tissue of Atlantic Salmon Larvae,
W74-04181 5C

Natural Radiation Loads on the Eggs of Marine and Fresh Water Organisms,
W74-04182 5C

PROCESS RESEARCH, INC., CAMBRIDGE, MASS.
Selective Nutrient Removal from Secondary Effluent,
W74-04045 5D

PUERTO RICO UNIV., MAYAGUEZ. DEPT. OF GEOLOGY.
Measuring Volumes of Sedimentary Grains,
W74-04056 2J

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRICULTURAL ENGINEERING.
Upslope Erosion Analysis,
W74-03799 2J

PURDUE UNIV., LAFAYETTE, IND. SCHOOL OF MECHANICAL ENGINEERING.
Thermal Interaction of two Streams in Boundary-Layer Flow Separated by a Plate,
W74-04236 8B

QUIRK, LAWLER AND MATUSKY ENGINEERS, TAPPAN, N.Y.
Generalized Simulation Models for Massachusetts Streams,
W74-04118 5B

READING UNIV. (ENGLAND). DEPT. OF ZOOLOGY.
Productivity of the River Thames at Reading,
W74-04093 5C

RENSSELAER POLYTECHNIC INST., TROY, N.Y. DEPT. OF GEOLOGY.
Control and Distribution of Uranium in Coral Reefs During Diagenesis,
W74-04070 2K

REX CHAINBELT, INC., MILWAUKEE, WIS.
Industrial Water Pollution Control--An Overview,
W74-04028 5D

RHODE ISLAND UNIV., KINGSTON. DEPT. OF CHEMISTRY.
Identifying Source of Petroleum by Infrared Spectroscopy,
W74-03854 5A

RHODE ISLAND UNIV., KINGSTON. GRADUATE SCHOOL OF OCEANOGRAPHY.

RHODE ISLAND UNIV., KINGSTON. GRADUATE SCHOOL OF OCEANOGRAPHY.
Biological Effects of Ocean Disposal of Solid Waste,
W74-03840 5C

RHODE ISLAND UNIV., KINGSTON. LAW OF THE SEA INST.
Fisherman Quotas: A Tentative Suggestion for Domestic Management,
W74-03991 6E

ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CALIF. ROCKETDYNE DIV.
U-Tube Aeration,
W74-04046 5D

ROCKWELL INTERNATIONAL CORP., THOUSAND OAKS, CALIF. SCIENCE CENTER.
The Relationship Between Galvanic Current and Dissolution Rates,
W74-04168 8G

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCES, MIAMI, FLA.
Impact of a Power Plant on a Subtropical Estuarine Environment,
W74-04189 5C

ROSTOV-ON-DON STATE UNIV. (USSR). RESEARCH INST. OF BIOLOGY.
Results of Acclimatization of Corophium sowinskyi (Mart.) in the Veselovsk Reservoir, (In Russian),
W74-04099 2H

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. COLL. OF AGRICULTURE AND ENVIRONMENTAL SCIENCE.
Effect of pH on Toxicity of Copper to Scytalidium Sp., a Copper-Tolerant Fungus, and Some Other Fungi,
W74-03857 5C

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. DEPT. OF SOILS AND CROPS.
Nitrate Leaching in Soil on Rutgers Agricultural Research Center at Adelphia, New Jersey,
W74-03897 5B

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. WATER RESOURCES RESEARCH INSTITUTE.
Investigation of the Effects of Urbanization on Precipitation Type, Frequency, Areal and Temporal Distribution, Phase II,
W74-03768 4C

SASKATCHEWAN UNIV., SASKATOON. DEPT. OF MECHANICAL ENGINEERING.
Transient Heat and Mass Transfer in Fully Developed Laminar Tube Flows,
W74-04237 8B

SCRIPPS INSTITUTE OF OCEANOGRAPHY, LA JOLLA, CALIF. GEOLOGICAL RESEARCH DIV.
'Internal Waves' Advancing Along Submarine Canyons,
W74-04261 2E

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF. PHYSIOLOGICAL RESEARCH LAB.
Respiratory and Circulatory Responses in a Hemoglobin-Free Fish, Chaenocephalus aceratus, to Changes in Temperature and Oxygen Tension,
W74-04227 5C

SHERBROOKE UNIV. (QUEBEC). DEPT. OF BIOCHEMISTRY.
Detection and Quantitative Measurement of Fecal Water Pollution Using a Solid-Injection Gas Chromatographic Technique and Fecal Steroids as a Chemical Index,
W74-03887 5A

SIBERIAN RESEARCH INST. OF PISCICULTURE, TYUMEN (USSR).
Experiment in Computing the Total Production of Zooplankton Using Ural Lakes as an Example (In Russian),
W74-04120 2H

SINCLAIR OIL AND GAS CO., TULSA, OKLA.
Determining Formation Water Resistivity from Chemical Analysis.
W74-04145 2K

SKIDAWAY INST. OF OCEANOGRAPHY, SAVANNAH, GA.
Chemical and Biological Survey of the Savannah River Adjacent to Elba Island,
W74-03804 5B

SLOVENSKE POLNOHOSPODARSKE AKADEMIE, BRATISLAVA (CZECHOSLOVAKIA). LABORATORIUM RYBARSTVA.
Preliminary Data About the Seasonal Changes and Vertical Stratification of Periphyton from the Middle Reach of the River Danube,
W74-04294 5A

SOBTOKA (STEPHEN) AND CO., NEW YORK.
The Impact of Costs Associated with New Environmental Standards upon the Petroleum Refining Industry. Part II. Structure of the Industry.
W74-04076 3E

SOCIETE NATIONALE DES PETROLES D'AQUITAINE, PAU (FRANCE).
Organization of Field Tests and Evaluation of Tricone Bit Performance Using Statistical Analysis and Sonic Logs,
W74-04160 8G

SOIL CONSERVATION SERVICE, RALEIGH, N.C.
Physical Effects of Maintaining Drainage Channels in North Carolina's Coastal Area,
W74-04075 2E

SOUTH DAKOTA STATE UNIV., BROOKINGS. DEPL. OF PLANT SCIENCE.
Increasing Water Utilization Efficiency of a Pasture Grass by Increasing Aftermath Through Plant Selection,
W74-03773 3F

SOUTH DAKOTA STATE UNIV., BROOKINGS. DEPT. OF SOIL SCIENCE.
Wind Erosion as a Factor in Soil Formation in the Pierre-Shale Landscape of Western South Dakota,
W74-03781 2J

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION, WAUKESHA.
Integrating Natural Resources into Areawide and Local Planning: The Southeastern Wisconsin Experience,
W74-03965 6B

STANFORD UNIV., CALIF.
A General Pressure Buildup Theory for a Well in a Closed Drainage Area,
W74-04144 8B

STANFORD UNIV., CALIF. DEPT. OF GEOLOGY.
Ground-Water Hydraulics in Aquifer Management,
W74-03913 4B

STATE UNIV. OF NEW YORK, BUFFALO. DEPT. OF CHEMICAL ENGINEERING.
Mixed Culture Biooxidation of Phenol. I. Determination of Kinetic Parameters,
W74-03879 5C

Mixed Culture Biooxidation of Phenol. II. Steady State Experiments in Continuous Culture,
W74-03880 5C

Mixed Culture Biooxidation of Phenol. III. Existence of Multiple Steady States in Continuous Culture with Wall Growth,
W74-03881 5C

STIRLING UNIV. (SCOTLAND). DEPT. OF BIOLOGY.
The Oxygen Consumption of Chironomid Larvae from Loch Leven in Relation to Temperature,
W74-04226 5C

SUSQUEHANNA UNIV., SELINSGROVE, PA. DEPT. OF GEOLOGICAL SCIENCES.
Environmental Determination Using Hydraulic Equivalence Studies,
W74-04060 2J

SWEDISH INST. FOR SURFACE CHEMISTRY, STOCKHOLM.
Waste Water Impurity Level Affects Flocculation Efficiency of Polyelectrolytes,
W74-04195 5D

TASHKENT UNIV. (USSR).
The Biology of Pike Perch in the Arnasaya Lakes System, (In Russian),
W74-03961 2H

Anti-Erosive Role of Natural Plants in Low Foot-Hills Bordering the Ferghana Basin, (In Russian),
W74-04287 4D

TECHNISCHE HOGESCHOOL, DELFT (NETHERLANDS).
The Hydraulics of Artificial Recharge,
W74-03820 4B

TEXACO TRINIDAD, INC., POINTE-A-PIERRE (TRINIDAD). RESEARCH LAB.
Column Partition Chromatographic Determination of Sodium Alkane Monosulfonates,
W74-03867 5A

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF AGRICULTURAL ENGINEERING.
Grain Sorghum Response to Trickle and Subserface Irrigation,
W74-04137 3F

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF PLANT SCIENCES.
Abscission Processes in Cotton: Induction by Plant Water Deficit,
W74-04136 3F

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF SOIL AND CROP SCIENCES.
A Resistance Model to Predict Evapotranspiration and Its Application to a Sugar Beet Field,
W74-03921 2D

TEXAS AGRICULTURAL EXPERIMENT STATION, BUSHLAND.
Optimum Forage Production and the Economic Alternatives Associated with Grazing Irrigated Wheat, Texas High Plains,
W74-04086 3F

TEXAS UNIV., AUSTIN. DEPT. OF CHEMICAL ENGINEERING.
The Optimal Expansion of a Water Resources Systems,
W74-03754 6A

THAYER SCHOOL OF ENGINEERING, HANOVER, N.H.
Design and Cost Allocation Algorithm for Waste Treatment Systems,
W74-04116 5D

TIKHOOKEANSKII NAUCHNO-ISSLEDOVATELSKII INSTITUT RYBNOGO KHOZYAISTVA I OKEANOGRAFII, KHABAROVSK (USSR).
Fecundity of the Grass Carp Ctenopharyngodon idella (Val.) in the Amur Basin (In Russian),
W74-04121 2I

TSENTRALNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT OSETROVOGO KHOZYAISTVA, ASTRAKHAN (USSR).
Water Supply in the Volga Basin and its Effect on Strugeon Reproduction, Family Acipenseridae Under Conditions of Natural and Regulated Flow, (In Russian),
W74-04279 8I

UNIVERSAL OIL PRODUCTS, ST. PAUL, MINN. JOHNSON DIV.
The 'Tenacious' Iron Bacteria,
W74-04143 5B

UNIVERSIDAD CATOLICA DE CHILE, SANTIAGO. DEPARTAMENTO DE EDAFOLOGIA.
Effect of Irrigation Frequency on the Average Evapotranspiration for Various Crop-Climate-Soil Systems,
W74-04140 3F

UNIVERSITY COLL. OF WALES, ABERYSTWYTH. DEPT. OF GEOGRAPHY.
Assessment of Coastal Changes with the Aid of Photogrammetric and Computer-Aided Techniques,
W74-04271 7B

UNIVERSITY OF NEW ZEALAND, ARMIDALE (AUSTRALIA). DEPT. OF ZOOLOGY.
Diel Variation in the Thermal Tolerance of Litoria gracilenta (Anura: Hylidae),
W74-04245 5C

UNIVERSITY OF SOUTHWESTERN LOUISIANA, LAFAYETTE. DEPT. OF STATISTICS.
Alternative Futures Using the Wollman-Bonem Models,
W74-03888 6A

UPPER MISSISSIPPI RIVER BASIN COMMISSION, TWIN CITIES, MINN.
Levels of Assessment,
W74-04035 6B

UPPSALA UNIV. (SWEDEN). DEPT. OF ANALYTICAL CHEMISTRY.
A Liquid Ion-Exchange Nitrate-Selective Electrode Based on Carbon Paste,
W74-03884 5A

UPPSALA UNIV. (SWEDEN). INST. OF ZOOLOGY.
Rotifer Plankton in Brackish and Freshwater Localities in Central Sweden,
W74-04041 5C

UTAH STATE UNIV., LOGAN. COLL. OF ENGINEERING.
Integrated Measurement of Soil Moisture by Use of Radio Waves,
W74-03772 2C

UTAH STATE UNIV., LOGAN. DEPT. OF ECONOMICS.
Preliminary Indicators of Income/Wealth Redistribution Associated with Bureau of Reclamation Projects,
W74-03771 6B

VANDERBILT UNIV., NASHVILLE, TENN.
Some Effects of Wastes on Natural Waters,
W74-03793 5B

VIRGINIA INST. OF MARINE SCIENCE, GLOUCESTER POINT.
Internal Geometry and Origin of Vegetated Coastal Sand Dunes,
W74-04061 2J

The Design of the Monitoring System for the Thermal Effect Study of the Surry Nuclear Power Plant on the James River,
W74-04246 5B

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF AGRONOMY.
The Simultaneous Effect of pH and Chloride Concentrations Upon Mercury (II) as a Pollutant,
W74-03782 5B

VSESOYUZNYI INSTITUT RASTENIEVODSTVA, LENINGRAD (USSR).
Drought Resistance of Pear Varieties of the Main Ecological-Geographic Groups, (In Russian),
W74-04220 3F

VSESOYUZNYI NAUCHNO-ISSLEDOVATELSKII INSTITUT GIGIENI I TOKSIKOLOGII PESTITSIDOV, KIEV (USSR).
Hygienic Evaluation of a Machine for Applying Granulated Herbicides in Canals of the Collector-Drainage Network, (In Russian),
W74-04166 5G

VYZKUMNY USTAV RASTLINNEJ VYROBY, PIESTANOCH (CZECHOSLOVAKIA).
Investigation of the Dynamics of the Moisture State of the Soil Under Several Years of Forage Crops and Under Sainfoin, (In Czech),
W74-03917 3F

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
Modern Sediments of Willapa Bay, Washington: A Coastal Plain Estuary,
W74-04209 2L

Some Physical and Chemical Properties of the Gulf of Corinth,
W74-04273 2L

WASHINGTON UNIV., SEATTLE. INST. FOR FOOD SCIENCE AND TECHNOLOGY.
Temperature-Gradient Incubator for the Growth of Clostridia,
W74-03878 5A

WASHINGTON UNIV., ST. LOUIS, MO. CENTER FOR THE BIOLOGY OF NATURAL SYSTEMS.
The Environmental Cost of Economic Growth,
W74-04088 5G

WASHINGTON UNIV., ST. LOUIS, MO. PROGRAM IN TECHNOLOGY AND HUMAN AFFAIRS.
Thermal Pollution and its Control,
W74-04234 5B

WATER POLLUTION RESEARCH LAB., STEVENAGE (ENGLAND).
The Chemistry of Cadmium in Natural Water--I: A Study of Cadmium Complex Formation Using the Cadmium Specific-Ion Electrode,
W74-03775 5B

Nutrient Budgets in Rivers,
W74-03947 5C

Aeration at Weirs,
W74-04113 5C

WAYNE STATE UNIV., DETROIT, MICH. DEPT. OF BIOLOGY.
Species Diversity of Chydorid Fossil Communities in the Mississippi Valley,
W74-03941 5C

WEST VIRGINIA UNIV., MORGANTOWN. DEPT. OF BIOLOGY.
A Comparative Study of Plankton Respiration in an Acid Polluted Lake and Its Acid Free Embayments,
W74-03935 5C

An Analysis of the Zooplankton Community in an Acid Polluted Reservoir,
W74-03938 5C

Primary Productivity in Relation to Chemical Parameters in Cheat Lake, West Virginia,
W74-04089 5C

WESTON (ROY F.), INC., WEST CHESTER, PA.
Treatment of Oily and Metal-Containing Wastewater,
W74-03852 5B

WINTHROP COLL., ROCK HILL, S.C. DEPT. OF ECONOMICS.
An Industrial Pollution Index,
W74-03889 5G

WISCONSIN UNIV., MADISON; AND WISCONSIN DEPT. OF NATURAL RESOURCES, MADISON.
Dilutional Pumping at Snake Lake, Wisconsin,
W74-04108 5C

WISCONSIN UNIV., MADISON. DEPT. OF ECONOMICS.
Common Property, Congestion, and Environmental Pollution,
W74-03958 6G

WISCONSIN UNIV., MADISON. DEPT. OF MATHEMATICS.
Contributions to the Theory of Surface Waves on a Viscous Fluid,
W74-03901 2E

WISCONSIN UNIV., MILWAUKEE. DEPT. OF CHEMISTRY.
Application of a New Method for Phosphate Concentration Measurements in Natural and Waste Waters,
W74-03900 5A

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Intensive Outdoor Culture of Marine Phytoplankton Enriched with Treated Sewage Effluent,
W74-04103 5D

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS. DEPT. OF BIOLOGY.
Regulation of Brain and Eye Temperatures by the Bluefin Tuna,
W74-04239 5C

WORTHINGTON CORP., SALT LAKE CITY, UTAH.
Operation and Maintenance of Centrifugal Pumps,
W74-04146 8C

WYOMING UNIV., LARAMIE. WATER RESOURCES RESEARCH INST.
Systems Simulation of Economic Factors and Their Relation to the Water System of Wyoming's Platte River Basin,
W74-03892 6A

The Effectiveness of Sand Filters for the Removal of Colloidal Manganese Oxides from Water Using Selected Cations as Filter Aids,
W74-03893 5F

ACCESSION NUMBER INDEX

W74-03751 6B
W74-03752 5D
W74-03753 5D
W74-03754 6A
W74-03755 8C
W74-03756 6F
W74-03757 6B
W74-03758 2H
W74-03759 5C
W74-03760 2G
W74-03761 5A
W74-03762 1B
W74-03763 5D
W74-03764 5D
W74-03765 5A
W74-03766 5B
W74-03767 5A
W74-03768 4C
W74-03769 2H
W74-03770 2J
W74-03771 6B
W74-03772 2C
W74-03773 3F
W74-03774 4A
W74-03775 5B
W74-03776 2G
W74-03777 5B
W74-03778 5B
W74-03779 7B
W74-03780 2J
W74-03781 2J
W74-03782 5B
W74-03783 2G
W74-03784 2G
W74-03785 2E
W74-03786 2E
W74-03787 2E
W74-03788 2J
W74-03789 2J
W74-03790 5B
W74-03791 5D
W74-03792 5B
W74-03793 5B
W74-03794 5D
W74-03795 5C
W74-03796 5B
W74-03797 5B
W74-03798 2J
W74-03799 2J
W74-03800 2E
W74-03801 2J
W74-03802 8I
W74-03803 4A
W74-03804 5B
W74-03805 4A
W74-03806 4B
W74-03807 5B
W74-03808 4B
W74-03809 7C
W74-03810 4B
W74-03811 4B
W74-03812 4B
W74-03813 5B
W74-03814 4B
W74-03815 4B
W74-03816 2E
W74-03817 5A
W74-03818 2E
W74-03819 4B
W74-03820 4B
W74-03821 4A
W74-03822 4B
W74-03823 5D
W74-03824 4B
W74-03825 5D
W74-03826 5D
W74-03827 2H
W74-03828 2J
W74-03829 2J
W74-03830 2A
W74-03831 6B
W74-03832 2H
W74-03833 2H
W74-03834 2E
W74-03835 2C
W74-03836 2E
W74-03837 7C
W74-03838 5A
W74-03839 5C
W74-03840 5C
W74-03841 5C
W74-03842 2K
W74-03843 2H
W74-03844 5A
W74-03845 2G
W74-03846 5A
W74-03847 5A
W74-03848 5A
W74-03849 5A
W74-03850 5A
W74-03851 5A
W74-03852 5B
W74-03853 5C
W74-03854 5A
W74-03855 5A
W74-03856 5A
W74-03857 5C
W74-03858 7C
W74-03859 5A
W74-03860 5A
W74-03861 8C
W74-03862 5A
W74-03863 7C
W74-03864 5A
W74-03865 2K
W74-03866 5A
W74-03867 5A
W74-03868 5A
W74-03869 5A
W74-03870 7B
W74-03871 5C
W74-03872 5C
W74-03873 5C
W74-03874 3F
W74-03875 5A
W74-03876 5C
W74-03877 5B
W74-03878 5A
W74-03879 5C
W74-03880 5C
W74-03881 5C
W74-03882 5C
W74-03883 3F
W74-03884 5A
W74-03885 5A
W74-03886 5A
W74-03887 5A
W74-03888 6A
W74-03889 5G
W74-03890 6B
W74-03891 6E
W74-03892 6A
W74-03893 5F
W74-03894 5D
W74-03895 5B
W74-03896 2F
W74-03897 5B
W74-03898 5C
W74-03899 5C
W74-03900 5A
W74-03901 2E
W74-03902 5B
W74-03903 5C
W74-03904 5C
W74-03905 5C
W74-03906 5C
W74-03907 6B
W74-03908 6B
W74-03909 6B
W74-03910 6B
W74-03911 5B
W74-03912 6B
W74-03913 4B
W74-03914 4A
W74-03915 3F
W74-03916 2A
W74-03917 3F
W74-03918 5C
W74-03919 5A
W74-03920 3F
W74-03921 2D
W74-03922 3F
W74-03923 2I
W74-03924 2I
W74-03925 2H
W74-03926 3F
W74-03927 2I
W74-03928 3F
W74-03929 3C
W74-03930 3F
W74-03931 5C
W74-03932 8I
W74-03933 5C
W74-03934 5C
W74-03935 5C
W74-03936 5C
W74-03937 5C
W74-03938 5C
W74-03939 5C
W74-03940 5C
W74-03941 5C
W74-03942 3F
W74-03943 3F
W74-03944 5C
W74-03945 2I
W74-03946 5C
W74-03947 5C
W74-03948 3F
W74-03949 5C
W74-03950 5B
W74-03951 6B
W74-03952 3B
W74-03953 2I
W74-03954 3F
W74-03955 6B
W74-03956 6B
W74-03957 5D
W74-03958 6G
W74-03959 5G
W74-03960 6B
W74-03961 2H
W74-03962 6E
W74-03963 6C
W74-03964 6G
W74-03965 6B
W74-03966 8A
W74-03967 6E
W74-03968 5G
W74-03969 6E
W74-03970 6E
W74-03971 6E
W74-03972 6E
W74-03973 6E
W74-03974 6E
W74-03975 5G
W74-03976 5D
W74-03977 5G
W74-03978 5F
W74-03979 5G
W74-03980 6E
W74-03981 6E
W74-03982 6E
W74-03983 6E
W74-03984 6E
W74-03985 6E
W74-03986 6E
W74-03987 6E
W74-03988 6E
W74-03989 5G
W74-03990 6E
W74-03991 6E
W74-03992 6E
W74-03993 6E
W74-03994 6E
W74-03995 5G
W74-03996 6E
W74-03997 6E
W74-03998 6E
W74-03999 6E
W74-04000 6E
W74-04001 2I
W74-04002 6E
W74-04003 6E
W74-04004 5B
W74-04005 6E
W74-04006 6E
W74-04007 6E
W74-04008 6E
W74-04009 6E
W74-04010 6E
W74-04011 6E
W74-04012 6E
W74-04013 6E
W74-04014 6E
W74-04015 6E
W74-04016 6E
W74-04017 6E
W74-04018 6E
W74-04019 6A
W74-04020 6E
W74-04021 6E
W74-04022 6E
W74-04023 6E
W74-04024 5A
W74-04025 5B
W74-04026 5G
W74-04027 8A
W74-04028 5D
W74-04029 6E
W74-04030 5G
W74-04031 6E
W74-04032 5G
W74-04033 6G
W74-04034 5D
W74-04035 6B
W74-04036 6E
W74-04037 5G
W74-04038 3B
W74-04039 6E
W74-04040 6D
W74-04041 5C
W74-04042 5D
W74-04043 5D
W74-04044 5G
W74-04045 5D
W74-04046 5D
W74-04047 4A
W74-04048 5A
W74-04049 2F
W74-04050 2J
W74-04051 2H
W74-04052 5B
W74-04053 5D
W74-04054 5A
W74-04055 2J
W74-04056 2J
W74-04057 2J
W74-04058 2J
W74-04059 2J
W74-04060 2J
W74-04061 2J
W74-04062 2J

W74-04063 2J
W74-04064 2J
W74-04065 2J
W74-04066 2L
W74-04067 2J
W74-04068 2F
W74-04069 2L
W74-04070 2K
W74-04071 8I
W74-04072 5A
W74-04073 5A
W74-04074 2G
W74-04075 2E
W74-04076 3E
W74-04077 5G
W74-04078 5G
W74-04079 5G
W74-04080 2K
W74-04081 5G
W74-04082 5G
W74-04083 5G
W74-04084 5G
W74-04085 6B
W74-04086 3F
W74-04087 5D
W74-04088 5G
W74-04089 5C
W74-04090 2H
W74-04091 2H
W74-04092 2I
W74-04093 5C
W74-04094 5C
W74-04095 5C
W74-04096 5C
W74-04097 5C
W74-04098 5C
W74-04099 2H
W74-04100 5C
W74-04101 5C
W74-04102 5C
W74-04103 5D
W74-04104 5A
W74-04105 5C
W74-04106 3B
W74-04107 5C
W74-04108 5C
W74-04109 2H
W74-04110 5C
W74-04111 5C
W74-04112 5C
W74-04113 5C
W74-04114 2G
W74-04115 5D
W74-04116 5D
W74-04117 6A
W74-04118 5B
W74-04119 5D
W74-04120 2H
W74-04121 2I
W74-04122 2I
W74-04123 3C
W74-04124 2G
W74-04125 2G
W74-04126 2I
W74-04127 3F
W74-04128 3F
W74-04129 2D
W74-04130 4A
W74-04131 4A
W74-04132 3F
W74-04133 3F
W74-04134 3F
W74-04135 3F
W74-04136 3F
W74-04137 3F
W74-04138 3F
W74-04139 5B
W74-04140 3F
W74-04141 8B
W74-04142 8B
W74-04143 5B
W74-04144 8B
W74-04145 2K
W74-04146 8C
W74-04147 8G
W74-04148 8G
W74-04149 5B
W74-04150 8G
W74-04151 8G
W74-04152 4B
W74-04153 8C
W74-04154 8C
W74-04155 4B
W74-04156 8G
W74-04157 2F
W74-04158 5B
W74-04159 8G
W74-04160 8G
W74-04161 8G
W74-04162 8G
W74-04163 2K
W74-04164 8F
W74-04165 2H
W74-04166 5G
W74-04167 8B
W74-04168 8G
W74-04169 8G
W74-04170 6B
W74-04171 5E
W74-04172 5B
W74-04173 5B
W74-04174 5A
W74-04175 5B
W74-04176 5B
W74-04177 5B
W74-04178 5C
W74-04179 5C
W74-04180 5C
W74-04181 5C
W74-04182 5C
W74-04183 5C
W74-04184 5C
W74-04185 5B
W74-04186 5B
W74-04187 5C
W74-04188 5B
W74-04189 5C
W74-04190 5B
W74-04191 5C
W74-04192 5B
W74-04193 2G
W74-04194 5C
W74-04195 5D
W74-04196 5A
W74-04197 5A
W74-04198 5D
W74-04199 5G
W74-04200 4A
W74-04201 2F
W74-04202 5B
W74-04203 2H
W74-04204 5B
W74-04205 2J
W74-04206 2L
W74-04207 2L
W74-04208 2J
W74-04209 2L
W74-04210 2E
W74-04211 2L
W74-04212 2E
W74-04213 2J
W74-04214 2E
W74-04215 2E
W74-04216 2E
W74-04217 2H
W74-04218 2L
W74-04219 2L
W74-04220 3F
W74-04221 2J
W74-04222 2L
W74-04223 2L
W74-04224 8B
W74-04225 5C
W74-04226 5C
W74-04227 5C
W74-04228 5C
W74-04229 5B
W74-04230 5D
W74-04231 8B
W74-04232 8B
W74-04233 5C
W74-04234 5B
W74-04235 3F
W74-04236 8B
W74-04237 8B
W74-04238 5B
W74-04239 5C
W74-04240 5C
W74-04241 5C
W74-04242 5A
W74-04243 5C
W74-04244 5C
W74-04245 5C
W74-04246 5B
W74-04247 2F
W74-04248 8B
W74-04249 8B
W74-04250 8B
W74-04251 2F
W74-04252 2J
W74-04253 2B
W74-04254 2G
W74-04255 2H
W74-04256 2H
W74-04257 5B
W74-04258 4B
W74-04259 5G
W74-04260 2F
W74-04261 2E
W74-04262 4B
W74-04263 5B
W74-04264 2J
W74-04265 5E
W74-04266 2C
W74-04267 2J
W74-04268 2K
W74-04269 2J
W74-04270 2F
W74-04271 7B
W74-04272 5B
W74-04273 2L
W74-04274 7C
W74-04275 7C
W74-04276 4D
W74-04277 2H
W74-04278 8I
W74-04279 8I
W74-04280 2I
W74-04281 5C
W74-04282 2I
W74-04283 2D
W74-04284 5C
W74-04285 2I
W74-04286 2I
W74-04287 4D
W74-04288 2I
W74-04289 2H
W74-04290 8I
W74-04291 2H
W74-04292 5A
W74-04293 5B
W74-04294 5A
W74-04295 5C
W74-04296 3F
W74-04297 5G
W74-04298 5A
W74-04299 5A
W74-04300 5C

ABSTRACT SOURCES

Source	Accession Number	Total
A. Centers of Competence		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W74-04171 -- 04192	22
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W74-03837 -- 03842 03844 -- 03873 03875 -- 03882 03884 -- 03887	48
Cornell University, Policy Models for Water Resources Systems	W74-03913 -- 03914 04115 -- 04119	7
National Water Well Association, Water Well Construction Technology	W74-04141 -- 04164 04167 -- 04169	27
University of Arizona, Arid Land Water Resources	W74-03773, 03916 03920 -- 03930 04126 -- 04140	28
University of Florida, Eastern U. S. Water Law	W74-03966 -- 03977 03979 -- 04000 04002 -- 04040	73
University of Wisconsin, Eutrophication	W74-03906 03931 -- 03938 03940 -- 03941 03946 -- 03947 04089 04093 -- 04098 04100 -- 04108 04110 -- 04113	33
University of Wisconsin, Water Resources Economics	W74-03888 -- 03891 03907 -- 03912 03951 -- 03952 03954 -- 03960 03962 -- 03965 04076 -- 04079 04081 -- 04088	35
U. S. Geological Survey, Hydrology	W74-03774 -- 03836 04047 -- 04070 04072 -- 04075 04247 -- 04275	120
Vanderbilt University, Thermal Pollution	W74-04224 -- 04234 04236 -- 04246	22
B. State Water Resources Research Institutes		
Alaska Institute for Water Research	W74-03757 -- 03759	3
California Water Resources Center	W74-04200 -- 04201	2
Colorado Environmental Resources Center	W74-03760	1
Georgia Environmental Resources Center	W74-03761 -- 03762	2
Illinois Water Resources Center	W74-03763	1
Kentucky Water Resources Research Institute	W74-03764	1
Louisiana Water Resources Research Institute	W74-03896	1

Source	Accession Number	Total
B. State Water Resources Research Institutes (Cont'd)		
Michigan Institute of Water Research	W74-04202	1
Montana Water Resources Research Center	W74-03765 -- 03766	2
New Hampshire Water Resources Research Center	W74-03767	1
New Jersey Water Resources Research Institute	W74-03768, 03897	2
New Mexico Water Resources Research Institute	W74-03898 -- 03899	2
New York Water Resources and Marine Sciences Center	W74-03769	1
Oregon Water Resources Research Institute	W74-03770	1
Utah Center for Water Resources Research	W74-03771 -- 03772	2
Wisconsin Water Resources Center	W74-03900 -- 03901	2
Wyoming Water Resources Research Institute	W74-03892 -- 03893	2
C. Other		
BioSciences Information Service	W74-03843, 03874 03883, 03915 03917 -- 03919 03939 03942 -- 03945 03948 -- 03950 03953, 03961 03978, 04001 04041, 04071 04080 04090 -- 04092 04099, 04109 04114 04120 -- 04125 04165 -- 04166 04193 -- 04205 04220, 04235 04276 -- 04300	67
Bureau of Reclamation	W74-04170	1
Environmental Protection Agency	W74-04042 -- 04046 04196 -- 04199	9
Ocean Engineering Information Service	W74-04204 -- 04219 04221 -- 04223	19
Office of Water Resources Research	W74-03751 -- 03756 03894 -- 03895 03902 -- 03905	12

☆ U.S. GOVERNMENT PRINTING OFFICE : 1974 542-957/21

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.

Subject Fields

- 1 NATURE OF WATER
- 2 WATER CYCLE
- 3 WATER SUPPLY AUGMENTATION AND CONSERVATION
- 4 WATER QUANTITY MANAGEMENT AND CONTROL
- 5 WATER QUALITY MANAGEMENT AND PROTECTION
- 6 WATER RESOURCES PLANNING
- 7 RESOURCES DATA
- 8 ENGINEERING WORKS
- 9 MANPOWER, GRANTS, AND FACILITIES
- 0 SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

- SUBJECT INDEX
- AUTHOR INDEX
- ORGANIZATIONAL INDEX
- ACCESSION NUMBER INDEX
- ABSTRACT SOURCES

U.S. MAIL

POSTAGE AND FEES PAID
U S DEPARTMENT OF COMMERCE

AN EQUAL OPPORTUNITY EMPLOYER

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
Springfield, Va. 22151

OFFICIAL BUSINESS
PRINTED MATTER

JOHN LITTLEWOOD
DOCUMENTS DIVISION
220-D LIBRARY

UNIVERSITY OF ILLINOIS-URBANA
3 0112 084232302